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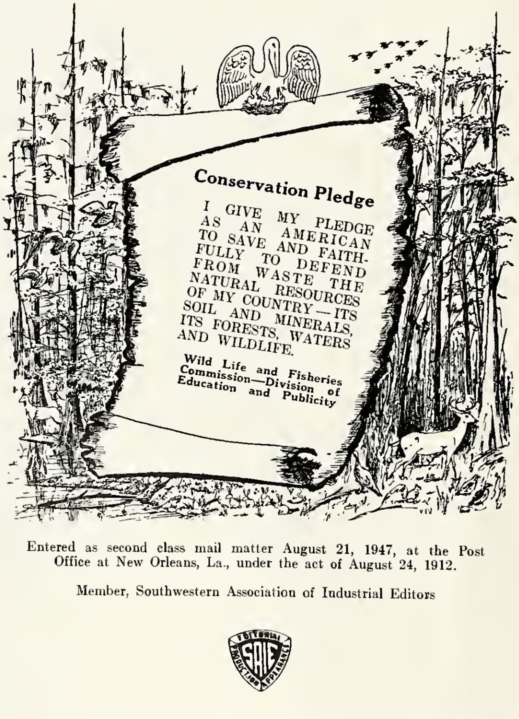

Conservation Pledge

I GIVE MY PLEDGE AS AN AMERICAN TO SAVE AND FAITHFULLY TO DEFEND FROM WASTE THE NATURAL RESOURCES OF MY COUNTRY—ITS SOIL AND MINERALS, ITS FORESTS, WATERS AND WILDLIFE.

Wild Life and Fisheries Commission—Division of Education and Publicity

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EDITORIAL

IN THIS ISSUE

OYSTER CULTURE IN LOUISIANA
by Lyle S. St. Amant 2

QUIRREL HUNTS ON MANAGED AREAS
by J. B. Kidd 4

S THE SEA INEXHAUSTIBLE?
by Percy Viosca, Jr. 6

SOME CURRENT WASTE TREATMENT PRACTICES IN LOUISIANA INDUSTRY"
by Kenneth E. Biglane 8

PATROL BY AIR
by Calvin Blackwell 11

HAD CONTROL IN LOUISIANA
by Don Geagan & James Davis 14

QUESTIONS AND ANSWERS ABOUT WILDLIFE IN LOUISIANA 18

OUISIANA WATERFOWL
by Dick Yancey 20

THE CHRISTMAS TREE
by Ednard Waldo 22

PLAN FOR BETTER QUAIL HUNTING
by Robert E. Murry 24

WHITE POULE D'EAU 27

THE LOUISIANA CARDINAL
by Hannah Yates 31

FISHING FOR BASS 32

COVER

THE OLD TIMER AND THE BOY!

—Photo by Blackwell

By F. Lamar Clement, *Director*

Louisiana Wild Life and Fisheries Commission

OUT OF OUR heroic struggle for independence there evolved the concept that all wildlife belonged to the people . . . that every American had a real and valid title to every wild animal, fish and bird.

This, of course, was one of the many ideas laid down by our forefathers in their efforts to guarantee equal opportunity for all individuals and to protect the inalienable rights of the citizens of their commonwealth.

F. LAMAR CLEMENT

However, when our nation was founded, the population was small and the country was huge and uncrowded, and there were vast acres of public domain where one could hunt almost wherever he wished. So how could our forefathers foresee the conflict which has evolved from the paradox of everybody's game and fish on somebody else's land?

From small beginnings our country has now grown to a powerful nation of some 170 million people and it has been estimated that our population may reach 300 million by the year 2000.

The axe and the saw have ripped down forests and laid former swamplands open to the sun. Roads, power lines, railroads, dams, oil and gas rigs and all the other paraphernalia of progress reach constantly into new regions and most of the wild things are forced to retreat before the onslaught and many species have become extinct in this process.

More incursions that are of equally staggering proportions are bound to come in new demands upon available space . . . land and water . . . for outdoor recreation typified by hunting and fishing. In Louisiana, the recent boom of industrial growth, especially in the oil fields and in the Mississippi river area these pressures on both wildlife and recreational space are being increasingly felt. This means that, among other things, that a larger population will be demanding an increase in game and fish numbers whereas our wildlife will be crowded into smaller areas.

Our own state once had vast acres of public domain available to the hunter and fisherman and there is still a great deal left. But one thing is certain: As the years pass we will become more dependent upon the indulgence of the private landowner for much of our hunting and fishing, and it behooves all organizations and individuals using the outdoors for recreation to work and conduct themselves in a manner so that the privileges that the landowners confer will not be taken away more than they have been.

This means that the hunting and fishing public, whether singly or through sportsmen's organizations must follow the accepted and well known rules of good outdoors manners and fair play by protecting and observing the rights of the owners on whose lands they are privileged to pursue their sports, and by keeping down plagues of vandalism and litterbugging and pollution.

Indeed, the game and fish are still everybody's but the land is quite often somebody else's. And unless the rights of the somebody's are protected, it will not matter at all whether everybody, or somebody, or nobody owns the game and fish because it may as well not be there if you can't get to it.

OYSTER CULTURE IN LOUISIANA

A view of the facilities at the commission's Grand Terre Marine Biological Station showing boat, Constellation, temporary laboratory and office buildings near dock and the living quarters of the personnel with Fort Livingston in the background.

Our Need for a Continuing and Expanding Technical Program

Lyle S. St. Amant
Marine Biologist

THE LOWLY OYSTER, a table delicacy and an epicurean delight, is not a seafood that can be harvested at ramdom from the seabottom. Although the oyster grows wild in the sea, it is a highly specialized and complex animal requiring a specific and restricted type of marine environment before it will grow naturally in abundance. Because of this, oysters are found only in certain areas and on certain types of bottoms which are usually associated with estuarine localities. Fortunately for Louisiana, the Mississippi, Pearl and Atchafalaya Rivers, their distributaries, and other lesser streams have created our famous marshes and the vast estuarine environment associated with our coast.

The oyster industry in Louisiana has developed over the years into a complex and valuable asset to the States. It involves some 3000 to 4000 oyster growers, over 50,000 acres of privately leased bottoms, several hundred thousand acres of natural oyster seed grounds and beds, numerous raw oyster packers and steam canneries. The gross value of the industry probably exceeds $20,000,000.00 annually and the net production of 800,000 to 1,000,000 barrels of oysters annually is valued at approximately $5,000,000.00.

Even in a near ideal environment, wild or natural oyster beds cannot furnish sufficient production to supply the great demand for this seafood. Only those States that have made oyster production a highly specialized type of fishery which actually amounts to oyster farming have been able to maintain or increase production to meet market demands. Louisiana is one of the few states which has maintained oyster production by oyster farming. Because of this fact and its excellent estuarine environment it produces more oysters than all other Gulf States combined.

The basic method of oyster farming in Louisiana involves a system of dredging seed oysters on State owned and controlled seed areas and replanting them on privately leased areas of bottom. Best seed production usually occurs in areas of relatively low salinity where oyster diseases and predators are absent or of little consequence. Oysters do not grow rapidly, fatten as well, or develop the best taste quality in such areas. When moved to high saline areas, where most private leases are, growth is rapid and taste and quality excellent. Moving oysters to such areas is not without calculated risks, however. Oyster diseases are more prevalent, a large percentage of oysters die after two summers in salty areas and many oysters eaten by snails and other predators. A secondary production of oysters from the extensive natural beds in Louisiana east of the Mississippi River furnishes the State of Mississippi with most of its oyster production as well as supplying many raw shops and local canneries.

The Oyster Division of the Louisiana Wild Life and Fisheries Commission is charged with the responsibility of

1. Conserving and maintaining oyster production in Louisiana.
2. Maintaining and controlling the harvest on state owned natural seed areas.
3. Surveying and leasing of waterbottoms to oyster growers.
4. Increasing the production and quality of oysters in Louisiana.
5. Furnishing technical aid and biological information on oyster culture, diseases, predation and the various problems of pollution and industrial damage to oyster areas.

Maintaining and increasing oyster production in Louisiana can only be achieved by increasing the acreage planted and by increasing the production per acre. Such an accomplishment in the face of the many problems now besetting the oyster growers can only come about through improved methods of production and technical aid. Since the oyster industry is essentially a type of farming the ideal technical program should be designed along lines similar to those programs offered regular farmers by various government agencies. The program should include—

1. A Marine laboratory or experiment station where basic research can be undertaken toward developing better methods of oyster production and determining means of controlling diseases and predators.
2. A series of studies and shell plantings designed to increase seed areas.

A view of the turning basin and canal at the side of the commission's biological lab at Grand Terre.

Marine Biologist, A. V. Friedrichs, at work in office section of Marine Biological Station.

3. Studies of the basic environment and consideration of environment control by the addition of river water and fertilization of waters.
4. Direct technical service, advice, and field aid to individual oyster growers in selecting oyster grounds, planting shells, controlling predators, and preventing disease.
5. Technical examinations and reporting of damage or pollution of privately owned leases caused by industry.

The Oyster Division of the Louisiana Wild Life and Fisheries Commission intiated such a program in 1955 and a gradual expansion of facilities, equipment and personnel has taken place consistent with the available budget. Some of the physical accomplishments of this program to date include—

1. A laboratory and experiment station site of some 100 acres is being developed on Grand Terre Island across from Grand Isle, La.
2. Some housing, a boat turning basin, docks and a temporary laboratory have been completed (see photographs.)
3. Four boats ranging in size from outboards to a 38 ft. cruiser have been equipped and are in constant use in carrying out field work.
4. Designs for an electrical cable to the island have been completed and construction is now being considered.
5. Plans, specifications and estimates for a modern marine laboratory suitable for the needs anticipated during the next 30 years are complete and bids for construction will be accepted in the near future.
6. Plans for the construction of experimental oyster and shrimp ponds are nearing completion.

The technical staff includes four biologist, one hy-

(Continued on page 28)

Squirrel Hunts On Managed Areas

J. B. Kidd
Game Biologist

FIVE LOUISIANA GAME management areas were opened to squirrel hunting by the permit system during the first part of the squirrel season. The number of days that these areas were opened varied from three to 14. Four of these areas had been opened previously, whereas the fifth area, the Thistlethwaite game management area, was opened for the first time this year.

On these five areas a total of 4843 hunts were made which resulted in the bagging of 7956 squirrels. The average kill per hunting effort on these five areas was 1.64 squirrels.

It was observed this year that the mosquito population was extremely high when the squirrel season opened. This, no doubt, influenced hunter success; many hunters shortened their hunts because of these pests. On the Thistlethwaite area, where the author worked, it was absolutely impossible to stay in the woods without some type of mosquito repellent applied. Even with mosquito repellent, the pests got in the hunter's mouth, nose and eyes hampering hunting considerably.

The accompanying tables are an analysis of hunting on these areas for each day hunted. The columns in these tables show the individual dates of the hunts made, the number of hunts made, the number of hunts made in each success class, the total squirrels killed and the average kill per hunting effort. For example the table for the Thistlethwaite area will reveal the following: on October 4 a total of 786 hunts were made, the third column in this table shows that 247 hunters didn't kill any squirrels, the fourth column shows that 147 hunters killed only one squirrel, etc. These data, in regard to success class are computed in this manner up through the limit kills of eight. The second to last column shows the total squirrels killed and the last column shows the average kill per hunting effort. Each days' figures are then totaled in the line second from last at the bottom. The bottom line designates the percent killed in each success class—for example 33.95 percent of all the hunters didn't kill any squirrels; 19.5 percent of all the hunters killed only one squirrel, etc.

The Thistlethwaite area produced the largest number of squirrels during these hunts. However, the hunter success on the Union area was very similar to that of the Thistlethwaite area. The average kill per hunting

"Watch where they fall." Gray squirrels blend with their natural surrounings making them very difficult to locate.

effort on the Union area was 1.92 squirrels as compared to 1.95 for the Thistlethwaite area.

It is noted that there were very few limit kills on all areas hunted. On the Thistlethwaite area, where hunting was best, out of 2860 hunts made, only 109 resulted in killing the limit of eight squirrels. On a percentage basis this represents only 3.8 percent of the hunts which resulted in killing 8 squirrels. On all five areas where 4847 hunts were made only 127 hunters or 2.6 percent were lucky enough to kill eight squirrels each.

It is also noted on all the areas that at least one third of the hunts made resulted in the killing of no squirrels at all. On the Jackson-Bienville area and the Evangeline area where success was poor, more than half the hunters fell in the zero class. The combined figures of all five areas revealed that 40 percent of the hunts were unsuccessful.

These figures indicate that the size of the bag limit has very little to do with total kill. In order to further demonstrate this point lets try to determine the kill on these five areas if the bag limit had been ten instead of eight. If, with a bag limit of 10, we assume that all the hunters who killed a limit of 8 would have been enough hunters to fill out a bag of 10 squirrels, only an additional 254 squirrels (less than one percent) would have been killed on all five areas. This figure was calculated by multiplying two, which is the increase in the bag from 8 to 10, by 127 which is the total number of hunters who killed a limit of 8 on the five areas in question.

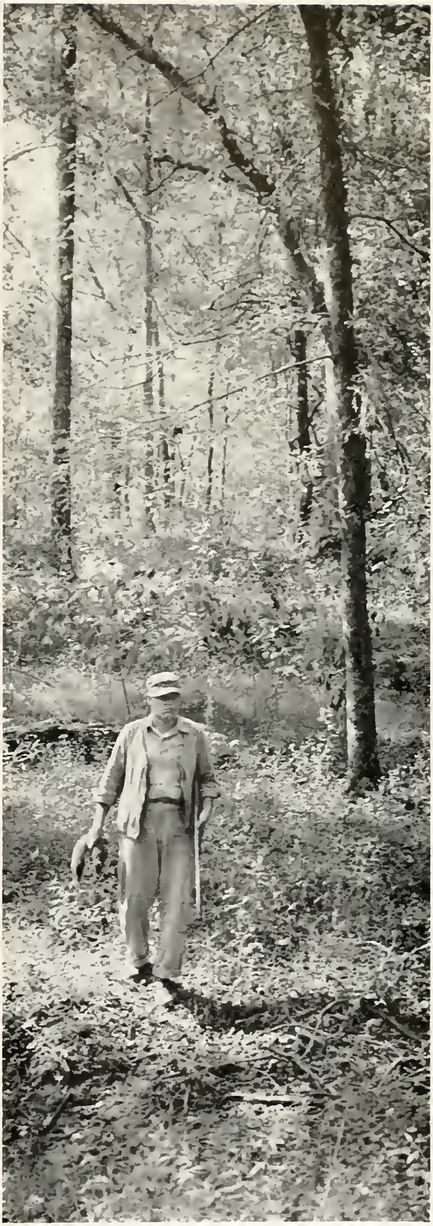
It has been learned through research on squirrels in Louisiana, that the hunter kills only 10—20 percent of the squirrel population each year. This point can be demonstrated by tag returns from the Grant-Rapides area during the recent season this fall.

During the summer of 1958, 102 squirrels were trapped, tagged and released on this area. In the course of the managed hunt, involving 757 individual hunting efforts, only 14 of these tagged squirrels were killed. In other words, hunters killed only 13.7% of the tagged squirrels on the area. Since the trapping stations were located throughout the area, it would be reasonable to assume that the kill of 13.7% of the tagged squirrels is representative of the kill in the total squirrel population on this area. These data are in substantial agreement with kill data gathered on this area in 1957 and analyzed in the same manner. The 1957 data revealed a kill of 15 out of 96 or 15.6% of the total squirrels tagged.

By the use of the above figures and total kill figures, a total area population can be computed. This would be 7,715 of which the hunter bagged 1,059. Assuming that the analytical methodology is correct and disregarding the following factors which are of unknown influence, (availability of summer young to trapping, natural mortality and crippling loss) there would be a total of 6,656 squirrels left on this area for production of next year's crop.

It is felt that this serves as a good illustration of the effects of hunting pressure as intensive as is normally exerted on any squirrel range in the state.

Using the above information, it is clearly indicated that annual legal hunting pressure exerts little influence on future squirrel populations.



Hunter-success has been described by game biologists as being on an upward trend this year. With the very heavy mast crop in most areas of the state, next years conditions should be even better.

(See chart on page 30)

IS THE SEA INEXHAUSTIBLE?

Percy Viosca, Jr.
Marine Biologist

Animal populations, be they insects, fish or any segment of the human race, have certain characteristics which are common to all of them when it comes to increase, stability or decrease in numbers.

When a group of animals suddenly finds itself in a brand new habitat which is suitable to it both physically and chemically and there are no serious competitors, predators and parasites present and food is there for the taking, such animals (or humans) will multiply for a time with astounding rapidity. Biologists call this phenomenon an "explosive population". It may happen with native or introduced species.

We have seen such explosive populations develop time and again on our new continent. We have seen the English sparrow, the starling, numerous insect pests, including the old-fashioned Argentine ant and the more recent importation the Argentine fire ant, multiply at explosive rates and produce vast populations. And let us not forget the nutria, a recent newcomer from South America, whose population has been expanding at an explosive rate in Louisiana and there is as yet no telling how much of North America it will eventually overrun.

Fortunately nature has its own ways of taking care of an explosive population, however harsh they may seem. Often even before we can shout "there ought to be law", and older "law of nature" takes over in the form of environmental resistance. The excessive numbers of the run-away population then began to die off, and the invading species settles back to a more rational existence in harmony with previously established species.

Environmental resistance may take the form of a food shortage; or predators, parasites, pests and/or diseases come into the picture and trim down the excess population. Hungry animals often attack and eat their own kind. In any case, the rate of increase of the exploding population will eventually slow down until it is equalized or exceeded by the mortality rate and the population level of the introduced species comes into balance with all environmental pressures; a balance which may be finely adjusted or variable. In the latter case, we say the species comes and goes in cycles.

The saturation level of a given species in a given environment, be it on land or in the sea, is called the carrying capacity of the environment, just as the maximum number of healthy cows a farmer can raise on a given ranch is called the carrying capacity of the range.

All of this brings us to our title question—"Is the sea inexhaustible?". For this question to be answered in the affirmative, a given species must be capable of replacing at an equal rate, any quantity of its population that the human race can harvest by whatever means it can devise. The answer is "no" if the human race, with his ingenious devices, can harvest faster than nature can replace.

Although it is difficult at this time to prove or disprove a pro or con statement on this question, let us consider the case of the white shrimp (*Peneus setiferus*), a species which has shown an alarming decrease in recent years. After the strange plankton stages of this creature develop into small juvenile shrimp resembling the adults, their very existence depends upon a special kind of environment—a muddy bottom covered with brackish water of relatively low salinity. When recently deposited alluvial silts well stocked with food and relatively free from enemies are available, the population seems to explode. Their population mass is now limited only by the total extent and the carrying capacity of such ideal white shrimp environments, at least that was the case until mankind came into the picture.

In contrast to such explosive population increases indulged in from time to time by shrimp, crabs, and various species of fishes and other marine organisms, the opposite phenomenon, rapid and drastic reduction, is equally common. With some species there have been diminishing returns often to the point of commercial and even actual extinction in our time. Although man can be blamed directly or indirectly for the extinction of a number of specie, paleontology teaches us that multitudes of species have disappeared from the face of the earth and from the waters of the sea long before man walked on the land. So we can't blame man for everything, unless some legislature sees fit to declare the laws of cause and effect retroactive to the beginnings of life on earth.

Since the last peak of production 1954, the shrimp harvest from Louisiana waters, and especially that of the formerly common or white species, has declined rapidly and, in 1957, reached the lowest level since 1932. The overall shrimp harvest would have been even worse were it not for the discovery of new shrimping grounds for brown shrimp (*Peneus aztecus*), which partially replaced the declining white species.

Biologists still believe that these ups and downs in productivity are basically due to natural causes, as would have been the case before man came into the picture. Data are accumulating, however, which show certain definite adverse trends whenever a fishery stock is subjected to a constantly increasing fishing pressure. Notable examples are seen in the reduction of accumulated stocks of North Sea and North Atlantic bottom fishes, the halibut of the Pacific Northwest, and the whales of the Northern Hemisphere. The fact that the North Sea and North Atlantic bottom fish stocks recovered during the two world wars, when fishing ceased, seems to be convincing evidence that overfishing was the cause of these particular declines. Could overfishing likewise be a major cause of the white shrimp decline? Time only will tell.

Although fishing is an age old industry, the possibility of overfishing the sea did not occur to us until late in the last century. It has become intensified with the advent of power boats, new harvesting devices, mechanical gear, and electronic equipment. As we gather more and more fishery statistics, the problems and principles of marine fishery biology become better understood. More and more in the fisheries literature we see such phrases as *saturation level, population dynamics, rational exploitation, fishing intensity, optimal catch* and others.

A lot of this sort of thing has been expressed in equations of various kinds, some fairly simple, others very complex. What it amounts to is this: that the weight of the catchable stock at the end of a year (or other natural or fishing cycle) is equal to the weight at the beginning of the period, plus the young individuals that have grown to catchable size during the period, plus the increase by growth of the catchable stock, minus the loss by natural mortality, minus the annual take by the fishery.

One difficulty with shrimp biology as compared to that of fin fishes is that we can't determine their ages by counting annual bone or scale rings, and shrimp don't live enough for us to calculate their growth, numbers and mortality by accumulating year classes, recruitment, and other figures necessary to work out formulae for determining the optimal catch. Without such data, any regulation by restrictive measures must be considered in the nature of an experiment

In regard to population dynamics, a balance of nature is maintained with the natural mortality rate increases as the population density increases and vice versa. Such could be the case with the brown shrimp, a species which does not form immense schools but is scattered over suitable grounds at a relatively uniform density per acre. Furthermore, their habitat is far more extensive than that of the white species, and some of it is untrawlable. Also, brown shrimp bury in the bottom in daytime, especially in calm clear weather, when their natural enemies are supposedly on the prowl.

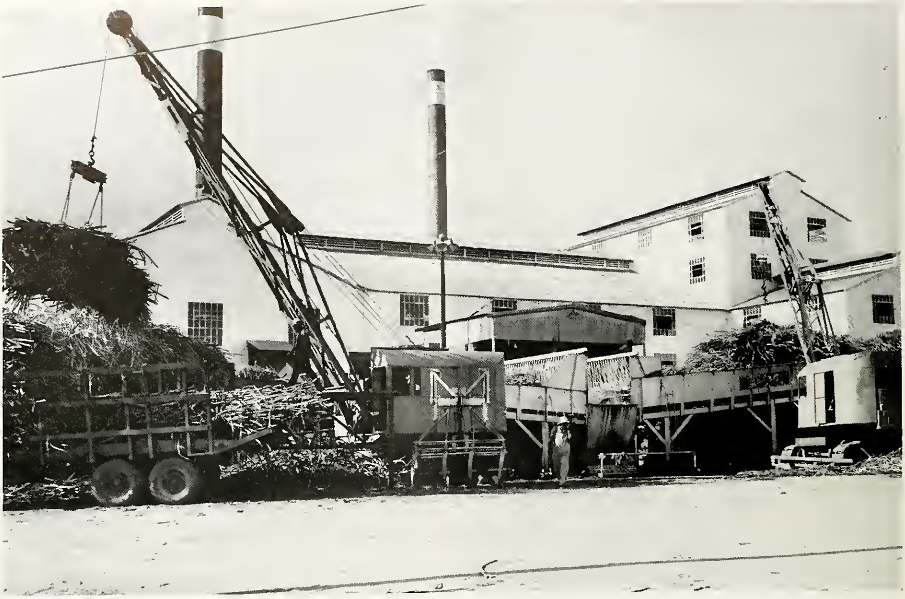
In contrast to this, the white, or formerly more common shrimp species, forages in large schools, and there are large blank spaces between the schools. Predatory fish will not enter such a school of shrimp, possibly because of some protective mechanism not yet fully understood. If such be the case, the greater the size of a school of white shrimp, the greater the degree of protection afforded from natural enemies, and as long as their food supplies hold out or they can move freely from an exhausted to a rich bottom, the relative mortality rate may actually decrease as the shrimp density increases.

Today, with man as the chief shrimp predator, all this is changed as far as white shrimp are concerned. With radio equipment on most boats, if a school is located, the captain, knowing that it may disappear with a change of the tide, calls his company boats or some of his friends. This is to his advantage, for the more trawls to muddy the water and stir up the food in the sediment, and the more trash thrown overboard to chum the shrimp, the more each boat will harvest.

All went well with the white shrimp population from 1921 to 1937, during which period, the catch per unit of effort remained fairly constant. After that there were violent fluctuations in the catch per unit of effort, reaching the all time peak in 1944, and the all time low in 1957.

I have often compared the sea to a balanced aquarium, with the admonition that if we disturb the natural balance, trouble lies ahead. Could it be possible that man has upset the balance at some critical point in the white shrimp's life history? This could have happened in more ways than one.

I have been considering the possibility that the white shrimp breeding population may have reached such a low level that larval production is no longer sufficient to meet the demands of natural enemies. It may be that sufficient young white shrimp are not reaching the best nursery grounds, although some of these areas are still biologically, physically and chemically capable of supporting much larger populations. Our rivers, after a lull of several years, are again depositing the special kind of environment needed to produce explosive populations of white shrimp. Will the reduced spawning stocks, however, be ample to restock the new nursery grounds to their full carrying capacity in a single season, or will recovery be delayed because of continued overfishing? We hope to have the answer soon.



Sugar factories, such as the one above, process the five-and-one-half million tons of sugar cane produced in Louisiana each year. Those plants, located on the Mississippi river, present no pollution difficulties from their waste liquids because of the tremendous volume of the river's dilution waters. However, other plants located on the slow-moving, sluggish bayous, of the Bayou Teche, Vermilion and Lafourche basins present a grave water pollution problem.

"Some Current Waste Treatment Practices in Louisiana Industry*"

Kenneth E. Biglane*

THE TREMENDOUS INFLUX of industry to the South in the past few years has rudely awakened this section to the fact that supplies of good water for industry, municipalities, agriculture, wild life and recreation may be exhaustible. Who would have believed that a state such as Louisiana would, in recent years, resort to crop irrigation, ration and relocate municipal water supplies, use cloud seeding techniques to stimulate precipitation, adopt stringent pollution control measures, encourage water reservoir construction, and generally term water as a "limited resource" in the state? Of course, most of the above mentioned measures were instituted during the very dry period the mid-South and Southwest experienced for several years prior to 1956. Nonetheless, it was demonstrated that the "mechanics" of nature could fail and the compounding of problems brought about by industrial adulturation of surface waters was something to be reckoned with immediately and in the future. Actually, Louisiana is normally a water rich state. It receives an average annual rainfall of about 56 inches and has over 3000 square miles of inland waterways through which over 450,000 million gallons flow daily.[1]

All of Louisiana's large cities and towns are located on major watersheds, for in the earlier days these were the easiest and, sometimes the only way to get into and outside the State. And so it followed that most of Louisiana's major industry has located in and around these cities for reasons of labor supply, transportation terminals, utilities, special services, and a multitude of others. These industrial-municipal complexes are of concern to water pollution control authorities everywhere.

The greatest amount of time, money, and effort (by state and federal agencies) to date on water problems in the State has been in land drainage projects, channel dredging, construction of levees, floodgates, locks, and other water control structures. In many instances drainage projects in some watersheds have brought about abnormal low flow conditions

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(*Executive Secretary Louisiana Stream Control Commission and Chief, Division of Water Pollution Control, Louisiana Wildlife and Fisheries Commission)

*Paper presented to The Thirteenth Purdue Industrial Waste Conference, Purdue University, Lafayette, Indiana, May 6, 1958.

[1] "Water", a Special Report to the Louisiana Legislature, Louisiana Department of Public Works, 1956.

during the dry months, a general lowering of the surface ground water tables, increased suspended solids content in the water, and enhanced salt water intrusion from the Gulf. Any one of these items can present problems to a pollution control authority but especially when they occur in the southern parishes of Louisiana where slow moving, sluggish bayous depict natural conditions.

The current industrial boom has brought many new industries to the State. Chemical, petro-chemical, metal ore refiners, petroleum refiners, and paper manufacturers have found Louisiana to be an ideal location for their activities. The development of natural resource minerals reached an all time high during the last decade and constitutes the greatest single industrial effort in the State today. Petroleum fuels comprised 91 per cent of the total value of all minerals produced in 1956[2]. This figure begins to reveal its magnitude when compared to the fact that in this its magnitude when compared to the fact that in this same year the State produced nearly 40 per cent of the nation's sulphur shipments; was the fourth largest in salt recovery; and mined 4 million tons of marine shell, 9.8 million tons of sand and gravel as well as large tonnages of clays and lime. Naturally, mining for these resources has created tremendous waste disposal problems both inland and in estuarine waters. The drilling for the production of petroleum fuels represents the industry having the most widespread disposal problems and it is with these groups that our first discussion will begin.

OIL PRODUCTION

The first oil field was discovered in Louisiana circa 1901 and according to the most recent estimates there are now 24,000 wells capable of producing oil or gas located in over 750 fields.[3]

Waste problems normally associated with the industry are usually encountered after the field or lease has been in production for some time. Oil field brines, wasted oil, corrosion inhibitor compounds, and an assortment of various chemicals used to separate oil-water emulsions may be found in effluent streams from these areas. However, in irrigation districts, in streams flowing through pasture lands, wild game areas, or serving municipal water supplies, and in waters over commercial shellfish areas, the wasteage from actual drilling operation can be extremely harmful and lasting. According to field reports from the Division of Water Pollution Control, Louisiana Wildlife and Fisheries Commission, Gulf Coast drilling operations can be expected to produce from 50 to 900 barrels of waste material per day over a 3 to 4 month period.

This pit, near an oil rig, holds drilling muds prior to treatment. The oils in the pit will be recovered and used for fuel in the rig's boilers and the muds will be treated so that they cannot pollute the surrounding marshes and destroy wildlife and vegetation necessary for the survival of both animals and marine life.

Above is the gigantic Esso Refinery at Baton Rouge with its huge storage tanks in the foreground. Some 13 petro-chemical plants now surround the Esso plant, Baton Rouge's oldest and largest industry which manufactures about 700 different proucts. In the background can be seen the winding Mississippi River. Esso has its own industrial docks just south of the Mississippi River Bridge.

These wastes are composed of process water, brines, well cuttings, water and oil emulsion base drilling muds, lost circulation materials such as cotton seed hulls, shredded automobile tires, tree bark, walnut shells, and a multitude of other fibrous materials, lime, sodium hydroxide, live crude oil in concentrations approaching 1 per cent by volume, and the composite waste has a pH range from 9 to 12.5.

One of the most potent constituents of this waste is the many types of fluid drilling muds. These materials are used in oil well drilling to carry well cuttings to the surface, to control subsurface pressures, to cool and reduce the friction on the drilling bit and drill pipe, to wall the hole with an impermeable cake, to hold cuttings and weight material in suspension when circulation is temporarily stopped, and to support part of the weight of the drill pipe casing.[4]

The basic muds are composed of fine bentonite clays with the sulfates of barium or lead added to give weight. According to their immediate needs these muds can contain diesel or other fuel oils in quantities ranging from 10 to 15 per cent by volume and are held in a tight emulsion by soaps, dispersants such as quebracho or other lignin type compounds, organic colloids, and powdered solids. The muds are mixed with water in quantities ranging from 8.34 to as much as 18 pounds per gallon of water. Of course, drilling muds are expensive and are recirculated dur-

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[2] "The Mineral Industry of Louisiana in 1956", Mineral Industry Surveys, U. S. Department of the Interior, Bureau of Mines, Annual Area Report, IV - 59, 1956.

[3] Boudreaux, F. J. and Winfiele, T. M., "Louisiana Oil Field Brine Production and Methods of Disposal," Presented to Research Committee of Interstate Oil Compact Commission, December 1956.

[4] "Mud Engineering, Magnet Cove Barium Corp., Houston, Texas. An undated pamphlet sponsored by Magcabor, Drilling Mud Services.

The above view looks east showing the Mississippi River Bridge at Baton Rouge dividing Ideal Cement Co. and Consolidated Chemicals (left) and the Kaiser Aluminum and Chemical Corp. (right). Kaiser's industrial docks can be seen in the lower right of photo.

ing drilling operations. After the well is completed the muds in the circulation system are hauled away to another location. However, large quantities are lost at the rig because of blowouts, washing out of the hole, incorrect batch mixing, leftover quantities from batch mixing, general negligence, cleaning of the drilling tools, and washdown of the platform.

After considerable persuasion by the states' water pollution authorities this waste is now being held at the rig site for treatment or in the case of open water rigs are hauled away in slop barges for disposal on the high seas or taken to inland treatment sites.

Treatment consists of impounding the material in a pit of sufficient size and skimming off all of the floatable oils from recovery or burning. Precipitation of the muds is accomplished by filtration through an excelsior or "poor boy" filter and followed by the addition of alum or a synthetic, organic, water soluble polymer. This organic flocculant is a relatively new material, and, according to researches by certain oil companies and state Water Disposal Inspectors, has reduced the cost of waste treatment from about 30 cents per barrel to about one and one-third cents per barrel. After flocculation the pit is again skimmed for floatable oils and oils that may have broken out of emulsion. The supernatant liquids are then drained away to another holding pit, neutralized, and discharged during high waters. The remaining muds are allowed to dry as much as possible and then are buried. Better methods of handling and disposing of this waste must be found but at least the present treatment is better than discharging the material directly into natural drains or to areas wherever the rig happens to be located.

SUGAR MILLS

Currently there are 49 raw sugar factories operating in the state. These mills are located in four major sugar cane producing areas which include the Mississippi area, the Bayou Teche Basin, the Vermillion Basin, and the LaFourche Basin. Because of the great volumes of dilution water afforded by the Mississippi River (average 125,000 cfs at low flow) there are no disposal problems in this area.

The other three basins are located in water areas characterized by the slow moving, sluggish bayous of South Louisiana. These streams are tidal affected, receive swamp drainage, bottomland runoff, and some of them are choked with emergent vegetation. All of the foregoing hampers the stream's natural capacity to assimulate organic wastes.

The cane grinding season starts in mid-October and runs continuously from 70 to 90 days depending upon weather conditions and the cane harvest. Sugar cane production figures reveal that between 5 and 5.5 million tons of cane are processed each year. The processing rate varies with each factory and ranges from 1000 tons to 3500 tons per day.

Modern day harvesting methods have compounded the waste problems even before the cane leaves the field. No longer do the field hands carefully cut the cane above the last colored joint, trim the flags, and lay the stalk across two rows. Instead, awkward looking machine harvestors, their cutting blades quickly dulled, gash and hack the cane, and sometimes pull it out of ground. The stalks are wind-rowed and after a few days the field of cut cane is set on fire to burn the leaves. Heat causes sugar to exude from the cane and this mixes readily with dirt and mud from the fields. The dirty cane is washed before processing inside the factory and this wash water, averaging 400-1000 gallons per minute, is hot, has a 5 day BOD ranging from 100 to 400 ppm and contains charred pieces of leaves, waxes, soil, sugar, and cellulose fibers.

The largest volume of water from the factory comes from the condensors and averages approximately 200,000 gallons per hour. Since all factories operate with varying degrees of efficiency, BOD figures exceeding 300 ppm have been recorded from some of these waters. This measure of organic concentration stems from entrained sugars from the multiple effects evaporators. A detailed review of sugar factory wastes may be found in papers by Wheeler[5] and Keller.[6]

Floor sweeping from the mills were revealed as another source of pollution. Drippings from the cane crushers, pipes, conveyors, and pumps gives this material a widely fluctuating BOD.

Muds from the juice clarifiers are mixed with fine bagasse and pumped through an Oliver filter. A cake or pressed mud is the waste product and this material has been shown to have a BOD ranging up to 200,000 ppm.

Acids and alkalies from blowdown, cleanout, and descaling operations round out the major sources of pollution from the sugar factory.

Current waste control measures adopted by the industry include impoundment or routing to the swamps all cane wash water, floor sweeping acids and alkalies. Filter press muds are returned to the fields to be used as a fertilizer.

Because of limited impoundment facilities, most factories return all condensor waters to the bayous. In order to eliminate sugar entrainment in these waters and to meet a Stream Control Commission Order of

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[5] Wheeler, J. E. and Keller, A. G., "Pollution Abatement in the Louisiana Sugar Industry," Proceedings of the Fifth Water Symposium, Louisiana State University Engineering Experiment Station, Bull. No. 55, pp. 31-45, 1956.

[6] Wheeler, J. E. and Keller, A. G., "Water Pollution and The Sugar Industry," Sugar Journal, pp. 20-23, April, 1956.

(Continued on page 28)

PATROL BY AIR

Calvin Blackwell

Staff Photographer

CARTOON STRIP FANTASY will allow us to visualize Game Agent Flintrock riding his pterodactyl through the prehistoric skies in search of dinosaur poachers; flying the Royal Game Commissioner to survey flood damage and pick up survivors; or rescuing an eager, but wiser, hunter who had a one-sided argument with a sabre-tooth tiger. Such situations are always presented for amusement purposes . . . to *stir* the imagination and afford an escape mechanism for the present which is, at times, not so amusing.

However, there is a very real 20th century counterpart to the foregoing in the form of the Aviation section of the Louisiana Wild Life and Fisheries commission. Many an illegal hunter or fisherman can attest to the feeling of nakedness of being spotted from the air in some remote area and, by the same token, many favorable testimonials can be given to the comforting sight of a plane bearing medical assistance to flood and hurricane victims.

So varied are the services of the Aviation section that it is difficult to identify it as performing any specific function. The off-season shrimper may think of it as a police department; the visiting conservationist sees it as an indispensible adjunct which allows him to prepare his reports in a limited time; the Commission employee takes it for granted as a taxi service to expedite the handling of a situation pertaining to his department whether it be a new development in some ecological situation, necessity of a waterfowl count, or investigation of stream pollution.

Whatever the situation, the commission's three planes . . . two Super Widgeons and one Cessna 180 . . . stand ready to take to the air at a moment's notice under the capable handling of three top notch pilots, each of whom has many years flying experience.

Spearheaded by Chief Pilot John Ellington, the Aviation section team composed of Ellington, Preston "Buck" Davis, and Nat Pedro has become an indispensable division of the Wild Life and Fisheries. The best equipment and pilots are useless, however, without adequate mechanical facilities to "keep 'em flying" and the commission is justly proud of its highly efficient ground crew which keeps all equipment tuned to a fine pitch.

Although the activities of this section are quite varied, the foremost single function is in patrol work . . . combing the vast Delta country of South Louisiana in search of violators or checking reports of violations of any of the many illegal operations characteristic of this area. In addition to the usual culprit encountered in inland game enforcement, the marshes and coastline spawn an added scourge . . . the illegal shrimper and oyster harvester . . . thoughtless individuals who place immediate pecuniary values over a continuous livelihood to be afforded by long-range planning. Embittered by the enforcement of legislation inaugurated for their own protection, these people are constantly devising new methods to thwart detection of their nefarious operations. Their most effective weapon was the design and widespread use of the "Lafitte skiff". These work boats are of all sizes and shapes, characterized only by the sharp bow tapering to a flat bottom and an inboard engine powerful out of proportion to the boat size. By the simple expedient of chopping or releasing his trawl line and opening his throttle wide, the illegal operator could outdistance most patrol boats in a matter of minutes . . . even before identification could be made. With all its speed, however, the "Lafitte skiff" is defensless against the speedier airplane. From the air it can easily be spotted and trailed until other agents in boats can be called in via the radio communications system to make an interception which often becomes a sporting event in itself. In one rather humorous incident, a whole armada of these skiffs were "buzzed" so closely by a patrol plane that, before realizing it, they unwittingly ran into a cove to escape, only to run aground, which made their confiscation a rather simple task for the agents in boats when they arrived. Continuous harassment by enforcement agent coupled with the financial loss sustained from the cut trawls has all but broken the back of the heretofore formidable "Lafitte skiff".

The very nature of conservation work requires much

(Continued on page 30)

Fish kills such as these are effected by the careful use of rotenone which eradicates most trash fish and allows the game and commercial fish to survive unharmed. Wildlife and Fisheries biologists are able to measure the "doses" eliminating possibility of harm to useful fish and contamination of the waters for re-stocking.

Shad Control in Louisiana

Donald W. Geagan & James T. Davis

Fishery Biologists

One of the most popular fish management tools currently employed by the Louisiana Wildlife & Fisheries Commission is the use of rotenone for the control of shad. This type of work was first done in Louisiana on Cane River Lake, Natchitoches Parish, in 1955. Since that time the number of lakes treated has grown until this year a total of 9 bodies of water were worked.

At first glance, to the average fisherman, the removal or killing of fish to improve fishing does not sound very practical. Especially, when in his opinion "the waters are fished out". However, this type of work is based on a very sound principle; the removal of undesirable fish will make room for more desirable ones. In this case, the removal of shad to improve the sports fishery.

Fish population samples collected in Louisiana waters by fisheries personnel have shown that overabundance of shad is one of the major problems affecting Louisiana waters. Fortunately, it has been learned that these fishes, the gizzard and threadfin shad, may be easily controlled with the use of rotenone. While rotenone in sufficient amounts will kill all kinds of fish, only one-tenth of a part per million is needed to kill shad. In contrast one-half to one part per million will kill desirable fishes. From these concentrations it may be seen that the fishery biologist has a relatively safe margin. Of course to be certain of staying within this safety margin, it is necessary that the volume of water in the lakes or ponds to be treated is known as closely as possible. Frequently this means extensive surveying and mapping are necessary.

The use of rotenone in this type work is preferred since this chemical has the desirable effects of being toxic to fish while in the same quantities it is harmless to warm blooded animals such as pets, livestock and humans. In addition rotenone is also desirable in that it's time period of effectiveness is limited and water treated with it may in a short time be restocked even when rotenone had been applied in quantities sufficient to kill all fish present.

The waters which have been treated to date are those in which shad problems were discovered in fish population samples. These were collected in conjunction with research projects, or at the request of local individuals, civic organizations, or local governing bodies. The usual procedure in the initiation of this type of work is a request of local individuals or groups requesting stocking or a simple request to improve the fishing in a particular body of water. If the request is for stocking, the parties concerned are informed of the Commission's policy of not stocking waters unless such work is deemed necessary by proper fish population sampling. If they so desire, the Fisheries Section personnel collect the necessary samples to be representative of the fish population of the body of water in question. These samples which may consist either of netting or poisoning one or more one-acre areas with rotenone, or both, are then analyzed and the findings are made available along with recommendations to the interested parties.

Due to the lack of funds, the Louisiana Wildlife & Fisheries Commission has no money available for the purchase of rotenone for shad removal. Therefore, interested parties are notified that the Commission will apply the rotenone if they will furnish the cost of the necessary amount of chemical. If this agreement is reached, it is next the responsibility of fisheries technicians to determine the exact amount of chemical needed for the project. This quite frequently calls for the aforementioned survey and mapping, in order to determine the volume of water to be treated.

After careful measurement of the area of water to be cleared of trash fish biologists of the Wild Life and Fisheries commission spread rotenone over the waters to eliminate undesirable fish. The poison if administered in proper proportions does not affect other marine life or livestock using the water.

Biologists of the Wildlife and Fisheries commission set out to eradicate trash fish from a body of water after requests from residents and parish officials to better the fishing by eliminating the useless fish to make way for larger and better game and commercials fish.

With one exception, all the waters treated in this program have had the application made in the late summer and early fall. One reason for this particular time of the year being utilized is that the water is still warm enough for the chemical to be effective. Another reason is that it is too late in the year for a spawn to occure among the shad which survive the operation. This in turn provides a more limited brood stock of shad for the spawning season of the following year.

As we have mentioned before, the use of rotenone for shad removal projects has become a very popular type of fish management tool. However, we would like to point out this type of project is definitely not a cure all for sports fishing ills. This type of work is effective only in those waters where an unbalanced fish population due to an over-abundance of shad is known to exist. In order to determine if such an unbalanced fish population does exist, it is first necessary that representative samples of the water's fish production be collected.

Of the 9 bodies of water treated, the two largest are Cane River Lake in Natchitoches Parish and Bayou DeSiard in Ouachita Parish. Cane River Lake is an old river bed, approximately 35 miles long with an average width of 250 feet. The surface area is 1044 acres and the average depth is 11 feet with a maximum depth of 25 feet. Cane River Lake has been selectively treated on two occasions prior to this year's work. In 1955 and 1957, the lake was partially treated, but this year's work was the first complete treatment for shad removal.

Rotenone samples taken in June 1958 in Cane River Lake showed a total production of 203 pounds of fish per surface acre. Of this production, 149 pounds were gizzard and threadfin shad. To look at it another way, 73 percent of the fish by weight in Cane River Lake were shad. Similar samples collected after the rotenone application showed slightly over 7 pounds of shad per surface acre of water. This represents a kill success for shad of over 95 percent of the original shad production.

This project and one other were conducted using 5 percent powdered rotenone. All the remaining areas were treated using 2.5 percent synergized liquid rotenone. The amount of rotenone for the desired concentration was calculated for each mile of the lake. As the lake was 31 inches below spillway level at this time much less chemical was required. Application was made on September 9, 10, and 11, 1958.

On the days of application very large numbers of shad were noted dying and on the following days in the same areas large rafts of dead shad were noted. Observations of the fish killed showed only 3 carp, 3 bluegill sunfish, and one largemouth bass in addition to gizzard and threadfin shad. However, reports from local sportsmen indicated that additional carp may have been killed.

Treated also this fall in Natchitoches Parish was a two-mile continuation of the former Cane River bed north of the main Cane River Lake. This body of water was the other lake referred to above in which powdered chemical was used.

Good fishing is returning to Bayou DeSiard also. During 1957 rotenone tests by fisheries biologists indicated that each acre in Bayou DeSiard supported 194.5 pounds of fish. Seventy-three (73 percent) percent of these fish, 142.7 pounds, were shad. Following the recommendations of fisheries biologists Bayou DeSiard underwent the first year of a shad removal project.

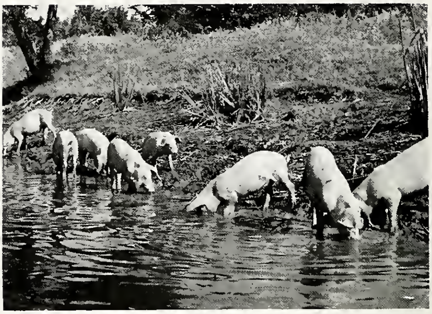
The rotenone was applied by fisheries personnel of the Louisiana Wildlife and Fisheries Commission on October 30 and 31. The money to buy the rotenone and pick up the dead fish was obtained by the Ouachita Parish Unit of the Louisiana Wildlife Federation. Most of this money came from public donations. The City of Monroe furnished trucks to haul away the shad after they were picked up. All in all this project was a fine example of cooperation by all people interested in fishing.

Let's take a look at what was accomplished by the first year's work. Fifty-two tons of dead shad were hauled away. It is estimated that a like amount did not float and decomposed on the bottom. These decomposing fish caused little inconvenience as the City of Monroe can also use the Ouachita River as a water supply.

Tests conducted early in the spring of 1958 indicated that over 85 percent of the shad had been removed. This was considered a satisfactory result by all concerned as fishing success increased accordingly.

As the summer progressed all fish spawned heavily. For the first time in several years bass and crappie (white perch) came off the nests in ample numbers. Channel catfish also spawned well. The shad out did them all. Tests in August of 1958 showed that the shad had climbed to 124 pounds per acre out of a total of 260 pounds. This amounted to 52 percent of the population.

Biologists recommended that the shad removal be repeated. The Ouachita Unit of the Louisiana Wildlife Federation agreed to sponsor the program again. As funds were limited, the Ouachita Unit agreed to buy the rotenone and depend on their own membership and local volunteers to pick up the dead shad. The City of Monroe again agreed to furnish trucks to haul away the dead fish.


Livestock are unharmed by drinking water from ponds and lakes treated with rotenone to eradicate trash fish. Application of the poison is made after careful surveys by biologists of the Wildlife and Fisheries commission who spread the poison over the waters in quantities which are deadly to the useless species and do not affect animals or game and commercial fish.

The rotenone was applied on September 25, 1958. Water in the bayou was warmer than on the previous year. Success was, therefore, much better. Tests conducted in October indicated that the shad population had dropped to less than 10 pounds per acre or a reduction of approximately 92 percent.

The majority of the residents of the area are well pleased with the results to date. Since the shad were removed by the application of rotenone fish catches have increased noticeably. Limit catches are not common but in the past "skunked" was the usual way to indicate your luck.

As this project has been successfully completed for 2 years much interest is shown by all concerned. During the coming summer tests will again be conducted to see how rapidly the shad population rebounds. If it gets too high the work will be repeated.

Three years are usually necessary to do a thorough shad removal. This is because shad usually live about 3 years. Those adult, egg laying shad which have been missed by the 3 applications of rotenone will die of old age. Thereafter the shad population will be held largely in check by bass and crappie eating what few small shad are hatched each year.

In St. Landry Parish, 3 borrow pits south of U. S. Highway 190 and west of Krotz Springs were rotenoned. These consisted of one 5.7 acre pond, one 5.2 acre pond, and one 17.1 acre pond. All of these ponds were sampled in the summer of 1957. The larger was sampled with the use of rotenone and two smaller ponds were sampled by seining. The results of these samples showed these ponds to have gizzard and threadfin shad populations of 62 percent, 59 percent, and 72 percent, respectively.

Since these ponds are open to public fishing, the property owners were contacted and they agreed to furnish the necessary chemical. The Louisiana Wildlife and Fisheries Commission personnel arranged to make application.

Actual work was done on October 6 and 7, 1958. A very successful shad kill was attained in two of these ponds. However, just to show that all does not always go as planned, one pond gave a kill of only 2 shad. Seining operations conducted later showed the shad population had experienced some type of set back in this pond. This had happened between the time of sampling and the date of shad removal.

In St. Mary's Parish a borrow pit of 60 surface acres, averaging 100 feet wide to 5 miles long, was rotenoned later in October, 1958. The original population samples collected in this pit in 1956 showed the threadfin and gizzard shad constituted over 55 percent of the total fish population. Samples collected in 1958 showed these shad had increased to 85 percent of the total population.

Application was made by spraying directly into the boat's wake, using 2.5 percent synergized rotenone. As usual, shad began surfacing shortly after application. It is interesting to note in a long body of water such as this the distribution of shad is uneven. In some areas shad surfaced in tremendous quantities, while in others only an occasional shad is noted even though the concentration of rotenone is equal in each section.

The last pond treated in 1958 was Holloway's Pond, Amite, Louisiana, where the cost of the chemical used was shared by local interests. This body of water is 27 acres in size, and is a former gravel pit which is utilized quite extensively by local fishermen. Application of liquid rotenone was made in late October and was applied in the same manner as described for all the other above mentioned waters. Shortly after application, large numbers of dead and dying shad were noted and it is believed a good kill was attained. This will be verified with follow-up samples taken next year.

The only body of water which was treated in the spring was the Audubon Park Lagoon in New Orleans. This area was found to contain exceedingly large numbers of gizzard shad during seining operations the preceeding year. After this shad removal operation, seining was again conducted. Previously 300 pounds of shad had been taken in a single seine haul. Now only one gizzard shad was caught. Additional samples will be collected to determine if the shad population is still being held in check.

As it can be seen from the above, the Fisheries Section had adopted this type of work rather extensively. However, one of the most important methods of evaluating this type of project has been neglected due to the lack of funds. This method is creel census. To date we have had to base our evaluation upon follow-up samples, and upon the opinion of local fishermen as to the improvement of the sports fishing. But neither of these methods provide us with exact figures as to how much the fisherman benefits from this type of program. This is the most important factor in conducting any fisheries management project. It is hoped that in the future funds will be available so that complete evaluation may be made. Then we will know not only that fishing improves after the removal of shad, but we will also know how much improvement has occurred, and for how long.

MORE HUNTING SEASONS TO COME

THE LOUISIANA Wild Life and Fisheries commission has announced that more hunting seasons are just around the corner for Louisiana sportsmen.

For most of the state, deer hunting began December 1, but there are some exceptions. All hunters are advised to check the regulations governing their own particular hunting areas. One exception is an open season of November 12 to January 10 in all or part of the following parishes: Vermilion, Iberia, St. Mary, St. Martin, Assumption, St. James, Ascension, Livingston, Tangipahoa, St. Tammany, Orleans, St. Bernard, Plaquemines, Jefferson, St. Charles, St. John the Baptist, Lafourche and Terrebonne.

The quail season opened November 27 and will close February 15, with a bag limit of 10 per day and a possession limit of 20. Also opening on the same date was the second part of the split dove season. This will run from November 27 through January 15, with a bag limit of 10 and possession limit of 20. Hunters are reminded that dove shooting is limited to afternoons, only.

Following will be seasons on woodcock and snipe. The woodcock season is December 12 through January 20. Bag limit will be four per day with a possession limit of eight. For the snipe, both bag and possession limits are eight. Snipe season opens on December 6 and ends January 4.

The commission also announced that the dates for the turkey season, usually held each spring, will be set next January.

Forestry Symposium Scheduled at LSU

SOUTHERN FOREST SOILS will be the subject of the eighth annual Louisiana State University Forestry Symposium to be held April 9-10, 1959, on the university campus in Baton Rouge, according to Dr. Paul Y. Burns, director of the LSU School of Forestry, who will serve as general chairman.

The symposium is held each year to bring foresters in the South up to date on the most recent technical advances in the field of forestry. About 400 foresters from the Southern states are expected to attend.

Twelve speakers, each a specialist in his subject area, will participate in the symposium, according to Dr. Burns Topics to be discussed will include fertilization, soil-moisture relationships, tree nutrition, and the relationship of site factors to forest land productivity.

Visiting foresters will be housed in Pleasant Hall, the university's guest dormitory. The symposium will be held nearby in the auditorium of the Music and Dramatic Arts Building.

For additional information, write Dr. Paul Y. Burns, Director, LSU School of Forestry, Baton Rouge 3, La.

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Air Section Plays Big

1.—Having received reports of trawling violation in Lake Borgne, Wild Life and Fisheries Pilots map out strategy. Left to Right "Buck" Davis, Nat Pedro, Chief Pilot John Ellington.

2.—Ground crew already has planes serviced and ready for take-off.

3.—Morning patrol. From the air a very large area can be quickly scrutinized.

4.—Having located the trawler, a Super Widgeon comes in for a close-up and pinpoints the location for patrol boats in the area.

5.—Agents in patrol boats move in under the ever watchful eye of their airborne counterpart.

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Commission Activities !

6.—The Chase! Hampered by the drag from the trawl and the psychological menace of "buzzing" planes the. . . . .

7.— . . . . . violator throws in the towel . . . . .

8.— . . . . . .is escorted to shore and . . . . .

9.— . . . . . is "written up".

10.—The curtain is drawn on another routine procedure. . .another illegal shrimper has been apprehended and relieved of his trawl, a rather expensive item usually. Whatever additional expenses are incurred will be at the discretion of the trial judge.

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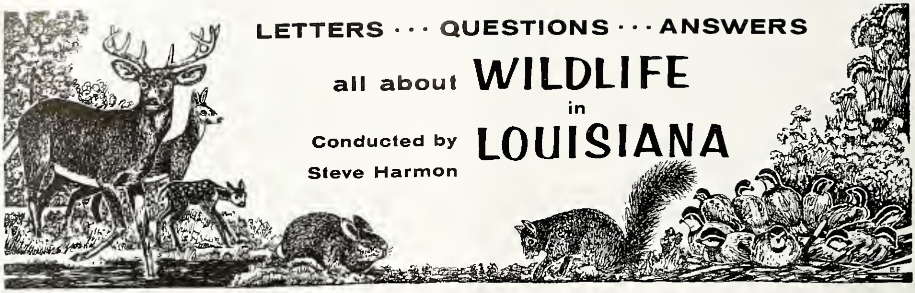
LETTERS · · · QUESTIONS · · · ANSWERS
all about WILDLIFE in LOUISIANA
Conducted by Steve Harmon



R. R. 1
Minster, Ohio
October 29, 1958

Dear Editor:

I am writing you to ask if you could send me a sample of feathers from your state bird and any other feathers from other birds in your state that is available.

I am a Sophomore in Fort Loramie High School, which is a small town in Ohio. The reason for wanting these feathers is to put on a display at our local *Science Fair*.

I hope you can help me.

Thank you very much.

Yours truly,
Ted Borhorst
R. R. 1
Minster, Ohio

Recently the Louisiana Wild Life and Fisheries Commission captured several brown Pelicans, Louisiana's official bird, for the Audubon Zoo in New Orleans when the American Association of Zoo Managers were there for a national convention. In return we are asking George Douglas, director of the Audubon Zoo, to send you a feather from this stately bird that graces the coastline of Louisiana all during the year. Good luck and success with the Fort Loramie High School Science Fair.

Steve Harmon

Department of Air Science
AFROTC Detachment No. 315
SOUTHWESTERN LOUISIANA INSTITUTE
Lafayette, Louisiana
10 November 1958

Dear Editor:

As Chief Instructor of a NRA affiliated gun club which is very interested in promoting sportsmanship and safety in hunting and target shooting, I am trying to locate some motion picture films (16mm) of Louisiana wildlife and game which could be used for either promotional or instructional purposes.

Would you be so kind as to advise me if such are available through your office or any other office you might know of, and how they might be obtained.

Sincerely
Donald D. Brown
Staff Sergeant, USAF
Rifle Instructor

The education and publicity division of the Louisiana Wild Life and Fisheries Commission maintans a film library on Wildlife and we would be happy to send you any of the films listed in our bulletin being sent to you, that is if film requested is not already out on loan. The only requirement is that we expect to receive each film loaned in the same condition when sent. Please use only competent projectionists when using our film. There is no charge for the use of the film, but we do request that you send them back prepaid.

Steve Harmon

October 9, 1958

Dear Mr. Harmon:

The snake I killed was marked with black bank across back and down side about one inch wide white between and along sides to belly on lower side between black was a black spot in white on lower side.

I have a page cut from some magazine some years ago printed in color pictures of snake with exact marking as described as above saying a pine snake very scarce in Louisiana found mostly in Rapides Parish.

Also have part of old Conservation magazine no date on it printed when L. D. Young, Jr., was commissioner. Piece written by Harry Shaefer and Don Geagan describing pine snake.

If I am wrong about the name let me know. I am trying to recognize different snakes in my neighborhood and would welcome any book or pamphlet describing snakes.

Yours respectfully,
Duffie F. McPhaul
Rt. 1, Box 153
Ponchatoula, La.

It may be that you have killed a specimen of the rare Ruthven's Pine Snake (also called Louisiana Pine Snake) but unfortunately the photograph does not provide sufficient detail for positive identification. As you mentioned in your letter the

range seems to be restricted to the vicinity of Rapides parish. If you ever find another one of these snakes the biologists of the Louisiana Wild Life & Fisheries Commission will be glad to identify it for you if you can get the specimen itself to us for detailed examination. If you cannot get it to us I am sure the personnel of the Museum of Natural Science at Louisiana State University would be equally cooperative in providing you with the identification.

We are always glad to receive information on the occurrance of rare and unusual types of wildlife anywhere in Louisiana and will be glad to identify any specimens that are brought to us.

I am sorry that we cannot provide you with a positive identification from the photograph but if we can be of any assistance to you along these lines in the future, please do not hesitate to call on us.

Sincerely,
Charles R. Shaw
Asst. P-R Coordinator

2953a So. 15, St.
Milwaukee 15, Wisc.

Dear Editor:

While in Louisiana last Easter I met some boys who had some fish they called Shopik or cypress trout. I would like to know is the fish edible or is it a rough fish.

Yours truly,
Greg Quartemont

The fish that you refer to in your letter is called in Louisiana the Choupique.

It is better known in other parts of the country as the Bowfin, and its scientific name is Amia calva. This fish is known by many other common names, a few of which are cypress trout, grindle, and dogfish.

This fish occurs in your part of the country and is eaten by some people. However, the majority consider them trashfish.

Harry E. Schafer, Jr.

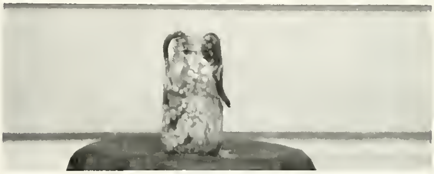
ANY QUESTIONS?

The Louisiana Wild Life and Fisheries Commission, publisher of the Louisiana Conservationist, is inviting their readers to send to the editor their suggestions and comments, also questions about wildlife species and oddities which will be answered in these columns by the Commission. Send yours in to Steve Harmon, Editor, Louisiana Conservationist, 126 Civil Courts Building, New Orleans, Louisiana.

In Roman times the horn of the white rhinoceros was believed to be a defense against poison and was often, in consequence, carved into cups or the drinking-horns of those days.

HOW ABOUT THAT?

Aboard Captain Charles Sebastian's Sea Rover, off Grand Isle, Mrs. Robert Wiemer, of Baton Rouge, was fishing for red snapper in 110 feet of water. Reeling in her line against a slow, steady and decidedly stubborn pull, Mrs. Wiemer saw what she had caught and still didn't believe it. She had brought up a fairly good-sized octopus, and the octopus had brought up his living quarters—an ordinary quart fruit jar. He was in there to stay . . . packed in so tight that he could not be removed until he died several hours later. In fact, he gripped the inside of the jar so firmly with all the little suction cups on his tentacles that one might even say he was "vacuum packed". We don't know whether he grabbed the bait and ran for home or whether he was spending a quiet Sunday afternoon at home waiting for somebody to drop in for a bite. In any case, the tangle this time was at the end of the line. We think he might have left the jar behind, but he just couldn't put his best foot forward. Odds: 8 to 1 against.



Others in the party, headed by Bill Smith, were Mr. Wiemer, Mrs. Elizabeth McCann, Mr. Gary McCann and Miss Sissy Odom, all of Baton Rouge.

RECIPE FOR MORE QUAIL!

QUESTIONS AND ANSWERS

In early spring combine the following ingredients:

8 pairs of well fed adult quail (alive)
1 acre escape cover (can be brushy fence row, briar patch, dense shrubs or vines, etc.)
15 acres nesting and roosting cover (can be weed fields, unmowed lespedeza patches, fence rows, etc.)
84 acres feeding cover (can be stands of grass and or weeds fairly open at ground level)
year-round food (can be insects, mast of trees and shrubs, berries, weed and grass seed, some agricultural crops, greens, or some of all of these.)

Mix ingredients well. Warm with a friendly summer sun. Sprinkle often with moderate rain, avoiding excessive drying.

Garnish with a brace of well trained bird dogs.

Serve after the frost melts on a crisp winter day.

Will provide 60 birds of which 40 should be harvested . . . but seldom are.

—Contributed by Robert Murry

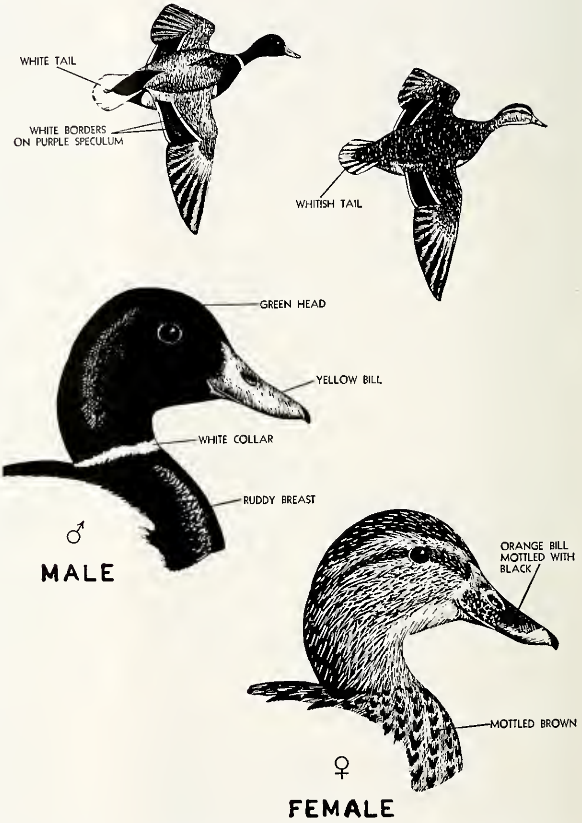
Although the gulls are almost always associated with the open ocean or coastal waters, the Franklin gull is so typical of our prairie states that it is frequently called "the prairie pigeon." It is the species that saved the Mormons' crops from hordes of black crickets in 1845-50.

LOUISIANA

By Dick Yancey

MALLARD

(Anas platyrhynchos)



THIS IS THE MOST sought after puddle duck that winters in Louisiana. Although the species make up only 25% of the State's total duck population, surveys by the Louisiana Wild Life & Fisheries Commission have revealed that 50% of the ducks bagged by hunters are mallards.

During the past three or four years Louisiana has wintered an average of about 500,000 mallards or approximately 10% of the total number found in the Mississippi Flyway. This percentage has been dwindling each year since more and more mallards are wintering further north in the Flyway. Mechanical harvesting practices now used in gathering crops of corn, soy beans and rice are leaving large quantities of grain scattered over the farmlands of Illinois, Indiana, Arkansas, and Missouri. This tremendous food supply coupled with the ready protection to be found in the numerous refuge areas is now fulfilling the wintering needs of most of the flyway's mallard population.

Since 1952 tremendous numbers of mallards have been produced in the prairie provinces of western Canada. This, however, has scarcely been noticed in Louisiana since most of these ducks are now wintering further north in the Flyway. Geographically, Louisiana is sitting on the "short end of the horn" and any future improvement in mallard distribution is dim indeed in spite of the prime habitat conditions to be found in the State. This same type of change in distribution occurred in the Flyway's Canadian Goose population and now Louisiana winters only about 2% of the total number of these birds.

The mallards are by far, the most adaptable species of waterfowl wintering in Louisiana. When it comes to food or cover they are far from being particular. Flooded hardwood bottomlands, buttonbush and cypress sfamps, open water lakes, rice fields, freshwater marshes and brackish water marshes are all heavily used by mallards. Dry corn fields, salt water marshes and even farm ponds are occasionally used and this includes about all known types of waterfowl habitat in the state.

They prefer very shallow water areas of less than 18 inches in depth for feeding. Rice, practically any seed produced by natural vegtation, the tubers of chufa or delta duck potato, and mast supplies from hardwoods, are all preferred mallard woods. Also heavily used are such aquatic plants as widgeon grass, coon-tail, southern naiads and duckweed. Even poison ivy seeds are frequently found in mallard stomachs and during drouth periods minnows, snails and many other forms of animal life are consume din large quantities.

Following the initial migration, flights of mallards continue to arrive in the state well into December. Normally the population reaches its peak between December 15 and January 1. The spring departure of mallards generally begins about February 1 and by mid March the exodus is fairly complete.

Over 100,000 duck stamps are sold annually to hunters in Louisiana, primarily for the purpose of hunting mallards.

WATERFOWL

PINTAIL

(*Anas acuta*)

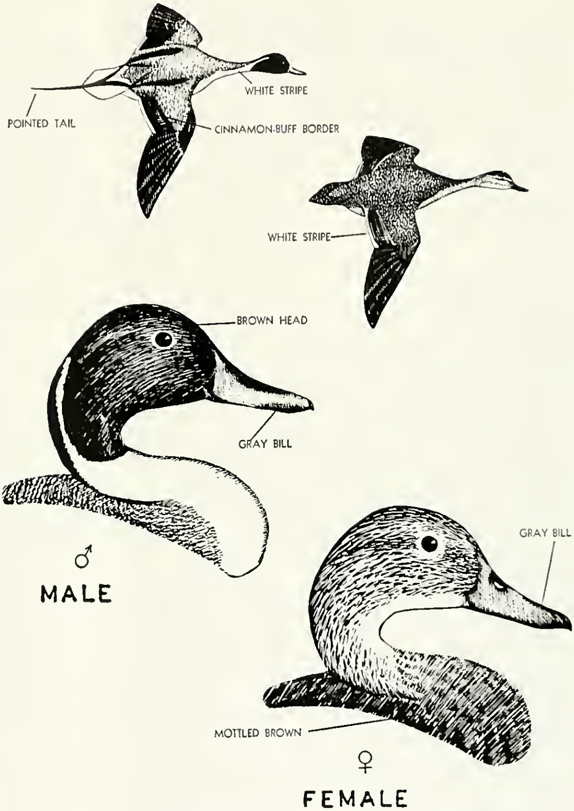
THAT PART OF THE Mississippi Flyway that lies in the United States is bordered on the north by Minnesota, Wisconsin, and Michigan, and on the south by Alabama, Mississippi and Louisiana. Within this vast area, Louisiana's waterfowl habitat is of great importance to pintails seeking a suitable area in which to winter.

During migration the pintail population travels primarily down the western half of the flyway. Many tens of thousands progress completely through the Flyway and winter in Mexico and points further south. Approximately 500,000 remain in the Flyway during the winter and about 85% of these are to be found in Louisiana. Most of the remaining 15% winter in Arkansas.

Surveys by the Louisiana Wild Life & Fisheries Commission during the past 8 years show that pintails make up about 20% of the State's wintering duck population but only 8% to 10% of pintails comprise the overall hunters' kill. These ducks are not bearing an equal share of the hunting pressure for several reasons: (1) They are not evenly dispersed over the state as the mallards are; (2) they are very sensitive to hunting pressure and immediately move into the nearest refuge once the shooting starts; (3) they tend to congregate in large flocks; and (4) a large part of the pintail wintering habitat is occupied by refuges.

After the hunting season starts most of these ducks stay within the waterfowl refuges during the daytime and feed out in the rice fields and marshes at night. Frequently they will travel 20 to 25 miles away from a refuge after sunset to feed and return just at dawn to rest for the day.

Pintails prefer marshes and very open areas and rarely use wooded or semi-wooded areas. For this reason their distribution is partly restricted in the State.



Catahoula Lake in LaSalle Parish and the marshes and rice fields of southwest Louisiana are the most important wintering areas in the state. Scattered numbers are also to be found in the marshes of southeast Louisiana, especially at the mouth of the Mississippi River.

At Cathahoula Lake, bumper crops of wild millet and chufa are produced on exposed mud flats during the late summer after the lake's water level has receded to a low point. During the winter these flats become flooded as a result of rainfall and the abundant food supplies become available to feeding waterfowl. Frequently during the winter over 150,000 pintails are to be found on Catahoula Lake and on occasion as 250,000 have been observed. Based upon past censuses this is the most important single wintering area in Louisiana. It will undoubtedly maintain this status so long as the natural fluctuation of water levels continue to permit an exposure of the Lake bed during the late summer. This condition is essential for the production of chufa and wild millet, two of the finest natural duck foods to be found anywhere.

Pintails migrate southward very early in the late summer, following closely behind the first blue-winged teal flight. A few always appear during late August.

A CHILD OF THE FOREST

The Christmas Tree

Edward Waldo

LEGENDS CONCERNING birds and beasts, both domestic and wild, associating them with the birth and life of Our Savior, would fill volumes for they are mingled in the folklore of almost every country, however, there is nothing more symbolic of brotherhood and friendship he preached than the Christmas tree and its ornaments.

Since earliest days it has been a custom in many countries to bring evergreens indoors at Christmas time in order to give the home a festive air.

The symbolic use of a tree, for an instance, dates back at least 4,000 years, when the Egyptians celebrated in honor of their Sun God during the month corresponding to our December. This was the season of rejoicing and the palm tree became its symbol.

More familiar is the story of Saint Wilfred. One day he was standing in the midst of a crowd of his converts. In order to indicate that they had severed all connection with the Druids and other heathen religions, he cut down a giant oak, one of the principal objects of Druidic worship. As it fell to the earth with a thunderous noise, it split into four pieces. From its very center there grew a young fir tree, pointing a green spire toward the sky. The converts gazed at it in amazement.

Wilfred let his axe drop and turned to speak. "This little tree," he said, "is a young child of the forest. It shall be your Holy tree tonight. It is the wood of peace, for your houses are built of the fir. It is the sign of an endless life, for its leaves are evergreen. See how it points toward heaven. Let this be called the tree of the Christ child; gather among it, not in the wildwood, but in your own homes. There it will shelter no deeds of blood but shall be surrounded with loving gifts and rites of kindness."

Hundreds of years passed and the tree became symbolic of celebrations connected with Saint Nicholas, the patron saint of children who, in his lifetime, was Bishop of Myra in Asia Minor. He was reputed to be very rich and it is said that he loved to make mysterious journeys bearing secret gifts to the poor.

A old story tells us that this kindly Bishop unintentionally originated the custom of hanging stockings by the fireplace at Christmas. Legend has it that he knew an old nobleman, who was very poor but did not want anyone to know of his poverty. Wishing to give him a gift of money, the Bishop crept to a window of the house and, seeing the old gentleman asleep by the fire, climbed to the roof and dropped his gift down the chimney, thinking it would fall on the hearth at the nobleman's feet. However, it so happened that the nobleman's daughter had hung some stockings to dry by the fire and the money fell into one of them.

Years later the anniversary of St. Nicholas' death in 1087 became a festival. In time his name became corrupted to Santa Claus and associated with the festivities of the Christmas season . . . the tree, its decorations, the holly and mistletoe. These are the joyous symbols of Christmas.

Some historians trace the custom of lighting the Christmas tree to Martin Luther (1483-1546). The story is told that he was strolling through the countryside alone one Christmas Eve under a brilliant starlit sky, when his thoughts turned to the nativity of the Christ child. He was awed by the beauty of the heavens and the wintry landscape; the blue light on the low hills outside Weimar; and on the evergreens, the snow flakes sparkling in the moonlight. Returning home, he told his family about it and attempted to reproduce the glory of the outdoors. To a small evergreen tree he attached some lighted candles to portray the reflection of the starry heaven.

But to the early Dutch settlers in our country, St. Nicholas was a favorite and in New Amsterdam, (New York), they named their first church in his honor. Santa Claus became the American form of Santa Nikalaus or, as they shortened it, Santa Klaus. Then in 1809, Washington Irving described him as a "tubby little fellow with a jolly manner, who sped through the air in a reindeer sleigh."

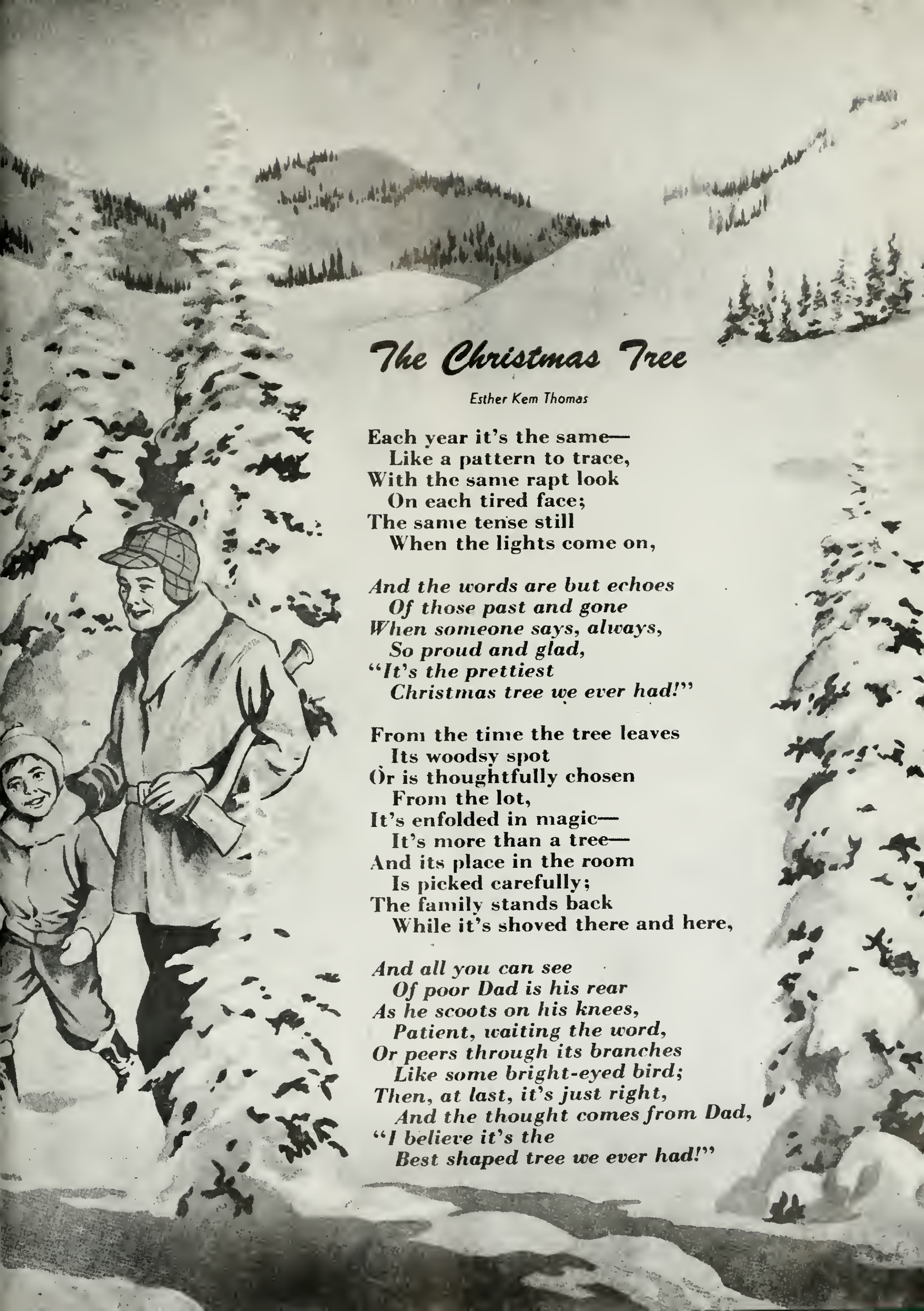
Trimmed Christmas trees were first used in the United States apparently during the American Revolution, when Hessian soldiers softened their homesickness with them. Subsequently, the idea and the tradition spread widely throughout the young land. Today, millions of homes are thus gladdened.

Those who object to the cutting of Christmas trees might well remember that forestry looks not only to the perpetuation but also to the wise use of woodlands. By careful selection of trees to be cut, it is possible to obtain evergreen trees without harming the forest . . . often, indeed, with positive benefit to it, just as it is possible to thin out stands of young trees for fuel and obtain faster growth and greater returns in saw timber from the remaining trees. Actually, if properly directed, there is no reason why the joy associated with the Christmas evergreen may not be a means of arousing in the minds of children an appreciation of the beauty and usefulness of trees. Keen appreciation of the beauty and usefulness of trees is a long step toward the will to plant and care for them.

In millions of American homes, particularly on the Atlantic seaboard, lighted candles appear at the windows on Christmas eve. This lovely ritual, borrowed from Ireland, is intended to light the Holy Family on its way. It also commemorates a fact of which many people are unaware: that on the night Jesus was born, candles burned in the Holy Land . . . in celebration of Chanukah, the Jewish Festival of Light.

We can thank the dazzling lights of Christmas for another seasonal bright spot, the singing of *Silent Night*. It's said that the stars and candlelight of a Christmas midnight inspired Austrian minister Joseph

(Continued on page 26)



The Christmas Tree

Esther Kem Thomas

Each year it's the same—
Like a pattern to trace,
With the same rapt look
On each tired face;
The same tense still
When the lights come on,

And the words are but echoes
Of those past and gone
When someone says, always,
So proud and glad,
"It's the prettiest
Christmas tree we ever had!"

From the time the tree leaves
Its woodsy spot
Or is thoughtfully chosen
From the lot,
It's enfolded in magic—
It's more than a tree—
And its place in the room
Is picked carefully;
The family stands back
While it's shoved there and here,

And all you can see
Of poor Dad is his rear
As he scoots on his knees,
Patient, waiting the word,
Or peers through its branches
Like some bright-eyed bird;
Then, at last, it's just right,
And the thought comes from Dad,
"I believe it's the
Best shaped tree we ever had!"

PLAN FOR BETTER QUAIL HUNTING

Robert E. Murry
Game Biologist

IF YOU ARE ALREADY a quail hunter you have probably made several important observations:

1. That good summer rainfall generally makes better hunting season quail populations.
2. That on normal years you are able to depend upon some areas to always yield nice coveys of quail despite the fact that you, and often other hunters, hunt these better areas more often. This had possibly made you suspect that overshooting quail is not much of a problem. In fact you may have even visited one of these areas in mid-May where the quail had been "wiped out" in February and wondered where all of those whistling quail managed to hide out during the legal season. You have also doubtlessly gone back the following winter and found coveys waiting for you at the same old stand.
3. You are sure to have noticed the almost unfailing ability of that old abandoned house place, with its idle fields, to produce quail.

Hunting quail on the fringe of a pine thicket.

Fire break type strips can be used for quail development.

Since we can not control the weather, and have confidence in the present regulations to prevent overshooting, let us then look at the places that produce quail and see what we can learn from them.

In any of man's deliberate activities dealing with the soil he goes to considerable expense and effort in doing what the ecologist would call "plant community manipulation". When he plants cotton he sees to it that cotton, not grass and weeds, gets the available moisture and soil nutrients. With or without planting trees he manipulates the forest plant community to see that the better commercial species are favored over the low quality trees. In improved pastures he introduces the forage plants he wants and starts them off with good cultural practices and even in his native pastures he often mows the undesirable bitterweeds etc. to allow his land to produce more and better forage.

Row crop, forest or cattle farming, if done successfully, requires attention to the plant communities which are associated with and affecting the primary crops. Just as the plant community helps regulate the amount of cotton, timber or beef that can be grown on an area, the plant community also greatly affects the number of quail that are produced. Needless to say, intensive cotton, timber, or cattle farming usually prove unfavorable to quail.

Our typical old field contains grass and weeds along with second growth shrubs and young trees depending upon the length of time it has been lying fallow. Since our cut-over pinelands often conatin the same general types of plants (grass, weeds, shrubs and trees) there must be some reason why the old field is the better producer of quail. Most quail hunters know this. The difference lies in the kind of grasses and weeds which are common to each.

In the old field common lespedeza, carpet grass, partridge pea, dollar pea, butterfly peas, milk peas, goatweed, beggerweed and fringe leaf paspalum are likely to be found in greater abundance than in the bluestem grass rough of the average cut-over area. Some of these plants are favored by moderate cattle grazing while others merely tolerate it. These better known foods, along with a long list of favorite spring and summer fruiting annuals, late winter "greens", dewberries etc., make year-round food and cover plants. Some of the old field plants such as yankee weed and broom sedge provide no food but often help make important feeding, travel, roosting and nestling cover. Generally speaking these old field covey ranges can support quail throughout the year. They do not always do this. Those adjacent to a good supply of pine mast or acorns usually lose their quail during the period that these foods are available. They normally come back to these old fields before the quail season closes. The role of such foods as common lespedeza, goatweed and partridge pea in maintaining good late winter and early spring physical condition and sending birds into the breeding season capable of full production is thought to be especially important.

We have discussed only old fields which naturally produce quail. Most abandoned fields can be made to produce more birds by:

1. Disking or plowing a portion of the field each year.
2. Plowing or buring a portion of broom sedge roughs—keep them open enough at ground level for easy movement of quail.
3. Mowing young haw, persimmon and sassafras bushes that threaten to take a field. All of these plants make good cover in clumps of the proper size but once they are allowed to shade the ground of a large area of the field they seriously affect food production. The same is true of blackberry briars if allowed to become too rank.
4. Select portions of fields that are producing good common lespedeza and plow fire lines to protect from spring and summer fires. The fire lines themselves will produce some food and moderate cattle use can usually be depended upon to maintain the lespedeza.
5. A good thumb rule is: Disk the sandier portions of an area for a voluntary stand of good weeds and manage the heavier soils for common lespedeza.
6. Do not attempt to treat a large field to any one practice all at one time. If all is plowed or burned at once you have one big bare field for awhile. Maximum value for quail is obtained by keeping a number of food and cover types interspersed.

Suppose you own or have management rights to some of the open range cut-over pinelands of the state. Quail management here is still plant community manipulation. Strips 15 to 30 feet in width, plowed and planted to common lespedeza at the rate of five to eight pounds of innoculated seed per acre, provide high quality late winter and early spring food. An initial fertilization of 3-12-12 at 200 pounds per acre is helpful, more chemical fertilizer than this will possibly cause excessive cattle use of the strips. By planting in early March the young plants are allowed to establish a good root system in time to survive moderate summer drouth.

Disking for more quail in the future.

Early establishment also allows the cultivated ground to become firm enough to keep cattle from pulling up many of the young plants when they turn to the lespedeza after the native grasses become less succlent in late May. Cattle use of the strips create almost bare ground conditions. This sparse vegetation is utilized by broods of young quail as a place to capture insects. They also provide excellent travel lanes, especially important during wet weather. Fortunately this plant can produce a fair to good seed crop despite moderate cattle use.

The lespedeza alone is not enough to support quail year-round. However, conditions created by normal land use in this area often provide the other needed components of quail range such as summer foods, nesting cover, and escape cover. These are less likely to occur naturally where large tracts of cut-over land have remained bare of any timber growth. Here accumulated roughs of perennial grasses work against quail in two ways: First good production by annual weeds and grasses is greatly hampered by competetion from the perennial grasses, most of which produce no usable seed, and second, the small amount of food that is produced is unavailable to quail due to the heavy roughs. In situations such as these simple disking of plots or strips create conditions favorable to quail. The plots or strips can be reworked every other year. The grower of young pine timber can easily make his disk strips serve as auxiliary fire breaks and access roads through the area.

Woody cover is lacking in some situations and the regeneration of good woody cover often requires several years. Slash from a logging operation or cull trees cut from the forest can be dragged together into window strips for temporary cover. When developing woody cover, protection from fire is essential. This is best done by plowing fire lines around young wax myrtle, scrub hardwoods, etc. If a prescribed burn is used to benefit pine production, one-third to one-half acre of good woody cover developed in this manner will often assure another covey range. Of course much

On the farm fencing and planting odd corners can pay off.

of this section has no shortage of woody cover and only lacks adequate food for much better quail populations.

One land use, from which an important part of our annual quail harvest in the pine type comes, is row crop agriculture. While row crop farming in the pine region is gradually giving way to cattle farming, tree farming and just plain land abandonment, quial populations around agriculture remain generally better than in the cut-over.

An important clue to quail management on the farm can be found from food habit studies of quail from farming areas. As important as the seeds of agricultural crops such as soybeans, peas, corn, milo and oats seem to be, on a year-round basis they play a poor second to the seed of grasses and weeds which are accidentally produced. Usually the more efficient the farming operation from an agricultural standpoint, the poorer the quail range it provides. Quail management around farms should be aimed at getting a better distribution of food and cover. Large fields and pastures can be made more producitve for quail by the creation of food and cover plots within them. Fencing odd corners against cattle and planting a mixture of Kobe and serecia lespedeza creates food and cover. Browntop millet is a good food plant whose seeds are especially sought by broods of young quail. Just letting the less fertile portions of the field lie fallow is often good farming and always good quail management. Where adequate cover is lacking protection from grazing and fire will generally restore ideal cover in a few years.

While this is written primarily for quail management in the pine timber type, with its generally poorer soils and less intensive land use, portions of it are applicable to quail management everwhere.

In an attempt to answer the questions most commonly asked by people interested in increasing quail hunting opportunities the following points are briefly made:

PREDATOR CONTROL: keep dogs and cats confined to the yard or barn.

STOCKING: Create yourself some good covey ranges and our native wild quail will occupy them almost before the postman can get your domestic mail order house birds to you.

PROTECTION FROM HUNTING: Everyone recognizes how foolish it would be to invest land, time and money in growing a good crop of cotton and then making no effort to pick it. Quail, also a crop of the land, should be harvested within reason each year.

The Christmas Tree

(Continued from page 22)

Mohr to write the words of the carol in 1818. His country man and fellow cleric, Franz Gruber, set them to music.

Another source of Christmas light illuminates this old French legend, a child-pleasing explanation of how the robin got its gaudy chest. It seems that an early bird charitably used its wings to fan the fire that kept the Christ Child warm as He lay in the manger. The glowing heat of the flames kept the robin's breast red forever after.

Through we've borrowed so much seasonal regalia from other lands, some of the world's most colorful Christmas customs have yet to be imported here. A shining example is the Mexican *posada,* held on each of the eight nights prior to Christmas eve. Carrying candles and figurines of Mary and Joseph, members of a family go from door to door seeking entry. Turned away by each of their neighbors, they're admitted to the last house on their "route", where they enter and sing their thanks. Next night a different family goes forth, and so on till the cycle is completed.

But some Yuletide novelties are better left abroad. We'd hate to follow the lead of the British Parliament that *banned* Christmas altogether. It happened in 1644. When Oliver Cromwell and his Puritan followers came to power, they looked askance at the gay and noisy celebration that had become a Christmas custom. One traditional item that particularly incensed them was the Yule log. This huge tree, chopped down with much merrymaking and burned throughout the holiday, had been the focus of seasonal revelry since the pagan sun-worshipping rites of ancient Britain, which had also taken place in late December. That was enough for Oliver, who banned the whole Christmas celebration as "immoral sun-worshippe."

There's no telling how dour, drab Oliver would have reacted to our modern Christmas, with its blazing glory of neon lights above the main throughfares of most American towns. In New York, a three-mile row of lighted Christmas trees . . . right down the center of Park Avenue . . . leads to a huge cross of lighted windows high in a towering skyscraper. Biggest blaze of Gotham glory is the mammoth tree outside Rockefeller Center. The largest Christmas tree in the world, its 64 feet of height are illuminated by 3,000 electric candles.

The most spectacular tree of all time brings to mind the most spectacular gifts of all time . . . and these too, have often involved lights. One devout Spanish king built a brilliantly lit chapel as a Christmas present for his queen, and less pious monarchs and millionaires have traditionally favored flashing jewels as Christmas love-tokens.

WHITE POULE D'EAU

ONE IN A MILLION—Steve Harmon, right, acting chief of the education and publicity division of the Louisiana Wild Life and Fisheries commission, presents the first white poule d'eau (coot) ever caught in Louisiana to Dr. George Lowery, director of the museum of Natural Sciences at Louisiana State University.

A WHITE POULE D'EAU, a mutation said by scientists to occur once in a million of this species, has been captured by a Louisiana sportsman and turned over to the Wild Life and Fisheries commission. The captor, Ted Simoneaux, of Thibodaux, accidentally caught the bird while building a duck blind in Lafourche Parish.

The bird, which is a perfectly formed American Coot, more popularly known as "poule d'eau" or "mud hen", was the first ever seen by the biologists of the commission and was brought to New Orleans by Steve Harmon, Acting-Chief of the Education and Publicity Division of the commission, who presented it to Dr. George Lowery, Director of the Louisiana State University Museum of Natural Science for its zoo at Baton Rouge.

According to Dr. Lowery, who is one of the nation's foremost authorities on birds, the coot is not an albino since it doesn't have pink eyes and other characteristics of true albinos, but is a mutation. It is entirely white with the exception of a small black spot on either side of the neck and beak. Dr. Lowery has a mounted specimen of a mottled Coot in the museum at Baton Rouge but says that such lack of coloration would appear in the species only once in a million times. The bird is the first he has ever encountered in his many years of observing millions of birds in Louisiana, according to Richard Yancey, chief of the refuge division of the Louisiana Wild Life and Fisheries commission.

The American Coot is one of the most widely distributed and numerous of our American water birds and is also one of the best known. Ordinarily every other "poule d'eau" seen in Louisiana or elsewhere has black and slate colored plumage, and is distinguished for its contrasting white bill. The new find is all white with the exception of the two black spots on the beak and neck.

According to Simoneaux, he and several companions were building a duck blind in preparation for the opening of the duck season when they came across a large flock of the birds who when disturbed flew away. However, instead of following the flock the white bird dove beneath the water and came up alongside the boat and Simoneau simply lifted it from the water. It is in excellent health and ate some crackers while awaiting transfer to the LSU zoo for a more suitable diet.

The "poule d'eau" has habits much like a duck and is often mistaken for real waterfowl. In general habits it is one of the most interesting of our marsh birds and peak population in the state is about 275,000 birds, of these about 125,000 remain in the state, the others push on to Cuba and Central America for the winter.

The "poule d'eau" often disdained by hunters, probably on account of its name "mud hen" is a legitimate object of sport and subject to bag limits, since its flesh, when properly cooked, and when the bird has been feeding on vegetable food, is extremely palatable. It lives in almost all kinds of marshy areas, about ponds, streams and particularly in the winter and in early and late migration time, in bays and lagoons and lakes of the coastal regions. It often gathers in vast flocks, which mass densely on the water or fly in close formation.

The food of the "poule d'eau" is varied in character, consisting primarily of foliage of water plants such as pondweeds, coontail and duckweed. Other items of its diet are snails, tadpoles, small fishes, worms and their larvae, together with crustaceans and other small water animals.

The nest is placed amid vegetation of a marsh or ponds, and is either floating and anchored to the vegetation, or built up from the bottom, and is normally rather bulky in structure, coarsely, though firmly constructed of grass, reeds, flags, and other aquatic plants, with a lining of finer materials of the same sort. The bird lays usually 8 to 12 eggs, but sometimes as many as 22 have been found in a nest.

OYSTER CULTURE

(Continued from page 3)

drographer and geologist, two maintenance men, and two boat operators. While this group represents only a minimum staff, it is about the limit of personnel that can be accommodated by the present facilities. It is hoped that with the completion of new facilities a permanent staff of twenty to thirty people can be attained of which at least 75% will be trained technical personnel.

No attempt is being made in this article to list or discuss the various technical oyster problems that are being studied or which need investigation. Suffice is to say that the problems are so numerous and complex that a large scale program involving a hundred or more trained technicians could be extremely profitable to the oyster industry during the next 20 years.

Racks holding experimental oysters trays at Grand Terre Marine Laboratory where experiments are constantly being conducted by the commission's scientists towards bettering the Louisiana oyster production picture.

Future articles prepared by the staff of the Marine Laboratory will deal with the various specific problems facing the oyster industry and some of the results obtained by research and technical studies to date. It is hoped that the complete series of articles will give a detailed picture of the oyster industry in Louisiana.

SOME CURRENT WASTE

(Continued from page 8)

1.5 lbs. of BOD per ton of cane processed, the factories have recently been installing circular mist eliminators constructed of stainless steel or monel. These devices are installed in the multiple effect evaporators. In discussing their efficiency with Dr. Arthur G. Keller, Professor of Chemical Engineering, Louisiana State University, it was learned that the higher these demisters were placed over the heaters, the more efficient they operated because bursting bubbles of concentrated sugar liquors would spray coat the undersides. Some mill owners have recovered up to six pounds more of raw sugar per ton of cane processed by the installation of these devices and our records indicate a lowering of the BOD to conform with the Stream Control Commission's Order. In 1956 and 1957 there was less pollution from the raw sugar industry than has ever been recorded during a grinding season.

SULPHUR MINING

Large scale sulphur mining is currently being conducted in the marshes, bays, and offshore areas of the Louisiana coast. This mineral is mined employing the Frasch process. Holes are drilled down to the deposit and lined with an iron casing. Inside this casing are two pipes, one inside the other. Superheated water (325°F) under pressure is forced down between the casing and the middle pipe, melting the sulphur in the formation. The melted sulphur pools around the casing and compressed air is turned into the innermost pipe. The sulphur is then forced upward by the air in the annulus between the inner and middle pipes.

An excellent paper on waste disposal in the sulphur mining industry in Louisiana has been written by Deiler[7], and liberal use has been made of his data in preparing this section. Other source materials include data abstracted from Freeport Sulphur Company's applications for waste discharge as presented to the Louisiana Stream Control Commission.

In sulphur mining by the Frasch process it is necessary to remove as much water and sulphur from the formation as water injected since a point would soon by reached where additional hot water would seriously injure the continued operation of the producing sulphur wells.

Sulphur well waste or bleedwater is a high salinity liquid resembling sea water. It has been noted that it contains the same salts as are normally found in tidal water. The most damaging constituent of this waste is its hydrogen sulphide content. Because the mines are located in brackish water areas the bleedwater is primarily treated to eliminate this gas and the companies employ four general treatment methods:

1. Spraying—to induce oxygenation by aeration.
2. Impoundment—to afford contact of the bleedwater with air. Its success depends on surface area.
3. Dilution—to induce oxygenated water.
4. Injection—limited use only because of non-availability or suitability of salt water sands.

Bleedwater is discharged at the rate of 1 to 3 million gallons daily and according to the area location, is pumped into a field storage reservoir. This water contains from 600-700 ppm of hydrogen sulphide and is piped from the reservoirs and sprayed into a retention basin. Spraying results in an approximate 50 per

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[7] Deiler, Frederick G., "Waste Disposal in the Sulphur Industry, "Proceedings of the Sixth Annual Symposium, Louisiana State University Engineering Experiment Station, Bull. No. 59, pp. 65-72, 1957.

The Freeport Sulphur Company recently completed mining operation off the coast of Grand Isle.

cent removal of the sulphide gases.

The retention basins are located in the open marshes and are enclosed by ring levees. Their size depends on the availability of marshland, the suitability of the marsh for supporting levees, and the volume of bleedwater produced. The smallest retention basin measures 25 surface acres and provides for a 10 day retention period. The largest impoundment provides for a 41-48 day retention period and measures 125 acres. The mining companies expect to reduce the sulphides in these basins to 10 ppm or below. Only in the smaller basin is the bleedwater sprayed before retention and therefore it has been found necessary to dilute the wastes from all retention basins before discharge. The wastes are conveyed from the retention basins to the Gulf in disposal canals measuring 100 feet wide and over 1 mile long. Bay and seawater is pumped into the canals so as to dilute the waste from a low of 10:1 to a high of 1000:1. Analyses for H_2S in these canals after dilution have repeatedly yielded concentrations less than 1 ppm and an oxygen content from 60 per cent saturation to saturation.

A unique venture is being undertaken by one company for it plans to erect a mining facility six miles south of Grand Isle, Louisiana, where Gulf depths measure about 50 feet. Plans for two drilling platforms connected by pipe lines and roadway supports have been received by the Stream Control Commission. The entire structure will be "Y" shaped, constructed 70 feet above the water's surface, have sleeping and boarding accomodations for almost 100 men, maintain its own power plant, and have aa helioport.

The mining facilities will be designed to inject an average of 5 million gallons of hot water daily, consequently, the waste disposal system is designed to treat the bleedwater which might reasonably be expected to result from this injection. Based on bleedwater production figures at other locations this facility would produce on the order of 4 million gallons daily. Miscellaneous wells will be directionally drilled into a cold, non-producing part of the formation to form the bleedwater collection system. The waste from this system will then be pumped to a collecting tank on the platform which will also serve as a flash tank.

The industry anticipates a reduction in hydrogen sulphide from 600-700 ppm initial concentration to 450-525 ppm in the flash tank. From the flash tank the waste will be piped to the suction of dilution pumps, which will effect a dilution of 100 parts of Gulf water to one part of bleedwater, thereby volumetrically cutting the concentration of dissolved hydrogen sulphide to 4.5-5.25 ppm. The company theorized that the oxygen content of the mixture will be sufficient to further reduce the hydrogen sulphide to less than 0.5 ppm.

This diluted mixture will then be discharged from pumps, outfitted with propeller dispersants, set at depths calculated to take advantage of the strong Gulf currents which prevail in that area. The effeciency of this system will be closely matched and more dilution pumps and dispersers will be added if necessary.

OIL REFINERIES

This section will not deal with specific inside processes used by the various oil refiners to abate pollution, instead a brief report will be given on what the entire industry is doing to study the situation. Some of the largest refineries in the world are located in Louisiana and their waste problems are numerous. Total effluent volumes approaching 10 million gallons per hour and coming from every conceivable type of petroleum processing unit has caused all of the major companies to unite and work together on this common problem. To date there are eight major refineries in the state and back in 1946 they formed an organization known as the Louisiana Petroleum Refiner's Waste Control Council. Each company formed its own oil conservation and waste control section. This section represents the parent company at council sessions. The Council meets at a different host refinery four times each year and mutual problems, technical papers on waste control, and an inspection tour of abatement facilities are afforded the members.

The Council also supports two industrial fellowships leading to gradulate degrees supervised by the Department of Zoology, Physiology, and Entomology, Louisiana State University. The fellowship holders perform toxicity studies on various constituents of refinery effluents utilizing fishes and invertebrate animals used by fishes for food.

The success of this program can be measured by the improvements noted in refinery effluents each year. The Council has been a tremendous help in stimulating in-the-plant researches on such items as the oxidation of petroleum wastes by sewage; the separation and recovery of oils from river silt deposits, phenol springing, vaporizing sour water streams in stack gases, and many other.

THINGS YOU MAY NOT KNOW

The United States has a smaller area than Europe, yet it has nearly five times as many kinds of fresh water fishes.

The red squirrel often sets up living quarters in several parts of its home territory. Then, if any enemy becomes interested in one den, the squirrel is prepared to move quickly to another.

Patrol By Air

(*Continued from page 11*)

travel over a widespread area for certain personnel. Speed is a prerequisite in expediting this work and the Aviation section is ever ready to furnish this service to whomever is in need of speedy transportation. For instance, in a typical flight . . . to the Pass-a-Loutre public shooting grounds . . . the passengers consisted of an enforcement agent returning to duty, a refuge supervisor checking on a maintenance situation, and a refrigeration repair man who was making the trip to service a deep freeze in the club house . . . a routine flight and all in a day's work, but its value is readily apparent when considering the time-saving factor.

The Aviation section demonstrated its true worth in time of disaster when hurricane Audrey swept through Cameron parish wreaking wholesale destruction to virtually everything in its path. Rescue operations were hampered by the absence of fresh water, destruction of gasoline supplies, and limited medical personnel. Washed out roads made automotive transportation of little value in the immediate disaster area for some time and gasoline supplies to service the boats had been destroyed. Some other source of transportation was needed . . . and quickly . . . if the hundreds of wounded were to be moved in time and if those not wounded were to be picked up from drifts before they became victims of the thousands of cottonmouth moccasins swarming over the debris. To all these problems, the airplane and its flexibility was the only answer, and planes of the commission and armed forces, as well as private and commercial units were pressed into service. The dead were overlooked for the moment . . . urgency demanded that the wounded be given first consideration. This entailed constant landings and takeoffs with wounded going out of the area and precious fresh water and gasoline for the boats being brought in on the return trip as well as medical and technical personnel. Many lives were lost in this grim disaster but one can only hazard a guess as to the possible total had it not been for the availability of modern air service.

Measures and countermeasures have been the theme of evolutionary processes through the ages, and the Aviation section stands as a symbol of the commission's determination to combat adversity with a bigger and better weapon than the problem itself: Hurricane Audrey, in all its fury, could have accounted for many more lives; many new biological situations could have developed and ceased to exist before qualified personnel could be transported to the scene; and the total shrimp and oyster population could have conceivably been eradicated. These possibilities have been alleviated to a practical minimum by the conscientious efforts of the pilots, ground crew, and office personnel of the Aviation section . . . the "air arm" of the Louisiana Wild Life and Fisheries Commission.

Squirrel Hunts on Managed Areas

(*Continued from page 5*)

October 4-17, 1958

SQUIRREL HUNTER SUCCESS

THISTLETHWAITE GAME MANAGEMENT AREA

Date	No. Hunts	No. Hunts Made In Each Success Class									Total Squirrels Killed	Average Kill Per Hunting Effort
						Success Class						
Oct.		0	1	2	3	4	5	6	7	8		
4	786	247	147	106	84	69	36	29	23	45	1762	2.24
5	661	233	111	110	76	50	27	15	14	25	1282	1.93
6	206	60	45	33	31	10	4	8	7	8	425	2.06
7	217	71	43	37	17	13	16	5	5	10	445	2.05
8	161	40	33	25	23	13	7	11	2	6	369	2.29
9	100	38	19	16	10	8	5	3	0	1	164	1.64
10	127	33	25	20	16	9	9	8	2	5	296	2.33
11	217	91	60	38	13	4	4	6	1	0	254	1.17
12	173	87	37	25	11	5	4	1	1	2	189	1.09
13	48	17	9	6	4	4	5	1	0	1	88	1.83
14	55	18	8	10	9	3	5	0	0	2	108	1.96
15	33	12	6	5	6	0	2	1	1	1	65	1.96
16	37	15	4	9	4	2	1	0	1	1	62	1.67
17	39	9	11	9	1	6	2	0	1	2	80	2.05
Totals	2860	971	558	450	305	196	127	88	57	109	5589	1.95
Percent		33.95	19.51	15.73	10.66	6.85	4.44	3.07	1.99	3.81		

The Gallant Aristocrat

THE LOUISIANA CARDINAL

(Richmondena Cardinalis Magnerostris)

Hannah Yates

That flash of red you see from tree to tree is usually the cardinal who has emerged from his home in some thicket, filling the air with his loud, clear whistle of many variations in which are heard single, double, or triple notes. There are other red birds but none in such numbers as the cardinal. He is the bird in a thousand, a combination of rare character and color, whose song is like that of no other bird except that of the Carolina Wren whose voice is similar in quality and quantity. It is a well-known and favorite bird, not only on account of its rich song and its bright red plumage and handsome crest, but also because it often takes up its abode in towns and home gardens.

The cardinal is a bird largely of the thickets and undergrowth and is not usually found in the deep forests. Although, in our state, we call it the "Louisiana Cardinal" it does not differ much in its habits from other kinds of cardinals to be seen throughout the United States.

The diet of the cardinal is most useful to man since it consists mostly of the seeds of weeds, wild fruit and harmful insects. Among the latter are such destructive pests as the potato beetle and Rocky Mountain locust, the cutworm, cotton worm, cotton boll weevil, cucumber beetle, plant lice and similar insects.

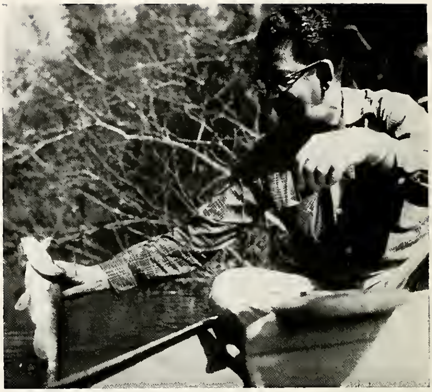
In thickets of brambles, grapevines, low shrubs and small trees the cardinals build their well-hidden nests which are loosely constructed of grasses, weed-stalks, bark, roots, leaves and twigs and lined with hair or fine grass and other soft materials. The three to four eggs are white, or bluish white, spotted with dark brown and lilac and resemble the eggs of the cowbird.

The attention the male gives to his dull-colored brown and buff mate is very noticeable. Although he does not assist her very much with the building of the nest, he leads his mate to some choice spot for a favorite food and at times even brings her food and helps her take care of the young, not only while they are in the nest, but also for a while after they leave and while she is busy hatching another brood. The cardinal is a model husband and therein is the remarkable charm that brings him enthusiastic praise from all who have lived near his habitat and observed his gracious ways.

Many a depressing winter's day is often brightened by the gay strong song, vigorous presence, and dashing air of this representative of one of the first families of the bird world.

Although almost every bird lover may have a pair of favorite cardinals in his garden he is sometimes startled to find his friends surrounded by numbers of other cardinals at times. Not because the cardinal is a gregarious bird, but he sometimes gathers into companies that number a great many individuals.

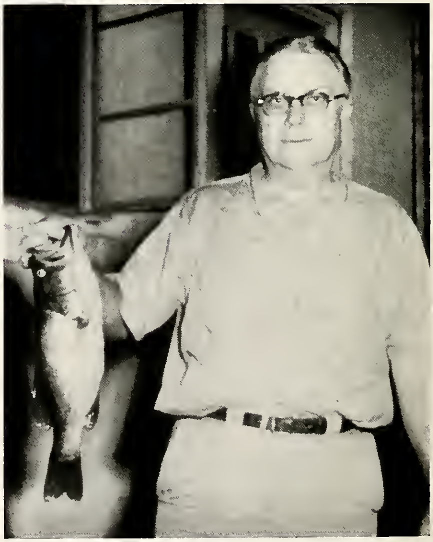
FISHING for BASS



Hugh C. Salassi, Baton Rouge contractor, lifts a three pounder out of the waters of the once flooded Atchafalaya basin area. Mr. Salassi and the editor of the LOUISIANA CONSERVATIONIST boated 30 of the largemouth and smallmouth bass in four hours of paddling and floating down one of the many bayous and canals out of Belle River near Pierre Part in Iberville Parish. In a three week period during October, more than 400 bass were caught in the area.

Fred Matthews boats another three pounder in one of the Pierre Part area bayous. Note the Bomber lure that was a sure striker if the bait was cast and allowed to drop two or three feet of the swift moving water.

Robert McGill, Baton Rouge real estate dealer, and Fred Matthews, Baton Rouge insurance executive, are shown in one of the bass productive bayous of the Atchafalaya basin area. McGill and Matthews caught 22 of the lunkers one afternoon in October.



R. B. Richardson, director of Highways for the State of Louisiana, holds up a four pound largemouth bass he caught in a man-made lake near St. Francisville on Saturday, November 15. Mr. Richardson, an ardent sportsman, says he has fished just about every lake and bayou in the state.

FALL and Wildlife

Waterfowl, returning from their far-north nesting grounds, line the autumn skyways.

The busy grey squirrel stores nature's bountiful harvest.

The smallmouth bass fisherman may have some of his best angling from September until cold weather.

Fall is harvest time for wildlife—take only your legal share.

Winter is ahead for wildlife—don't forget them then.

In the higher elevations some individuals may be preparing for a nap.

Courtesy *Virginia Wildlife*

MRS RUTH CAMPBELL
CURATOR OF LA ROOM
LA STATE UNIV
BATON ROUGE LA

QUAIL SEASON OPENS ON NOVEMBER 27 IN LOUISIANA